Digital Competence and Professional Development of Vocational Education and Training Teachers in Queensland

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Abstract

The use of emerging technologies in education is rising; however, the use of these new technologies among Queensland Vocational Education and Training (VET) teachers is largely unknown. While there have been some international and national studies on the use of information communication technologies (ICTs) and their implementation within universities and schools, there has been comparatively little research focusing on the digital competency levels of VET teachers in Australia, or how current Professional Development (PD) programs are addressing this capability.

This study focuses on the Australian VET sector and makes comparisons with schools and higher education in the understanding, management and use of educational technology. Survey responses from 206 participants from largely public and private registered training organisation (RTO) VET teachers were collected. The perceptions and confidence levels of current teachers, and their interactions with technology and digital pedagogies, are analysed to determine which group would benefit most from a PD intervention. Data from surveys and interviews is analysed to characterise the current digital competency of VET teachers.

Using four elements of TPCK: Technological (TK), Technological Pedagogical Knowledge (TPK), Technological Pedagogical Content Knowledge (TPCK) and Technological Content Knowledge (TCK) the digital competency of Queensland VET teachers and trainers can be characterised as not very strong. It was clear that teachers felt the most confident in TCK and felt that TPCK was their weakest capability. As the most complex skill in TPCK, this indicates that PD should target TPCK in particular. These results demonstrate that current PD opportunities available do not adequately address teachers' digital competency needs, and there is significant room for improvement.

Significant findings from this study include the fact that the most in-need teacher group is those involved in community-based disciplines – rather than those teaching in trades and business – and the lack of monitoring and tracking of teacher digital capabilities. Younger respondents were more capable of completing intermediate tasks compared to their older counterparts; this was evident across all devices. Again, this is another consideration when recruiting staff, as the results here clearly demonstrate that younger VET employees are more confident and capable with ICT. The future of PD in VET must ensure that technology is a key factor, which ensures that RTOs are competitive, institutionally viable, and an attractive option for learners. It is intended that findings from this research will inform future policy reform around how PD resources are allocated in the budget conscious Queensland VET sector. Such as the use of implementing PD intensives for VET educators where they are taken out of their teaching environment to develop their ICT skills and knowledge of digital pedagogies.

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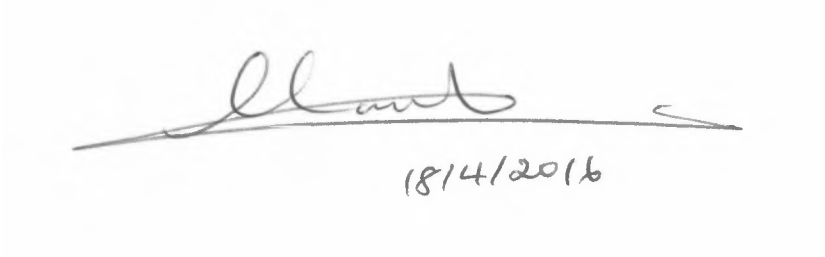
List of Abbreviations

ACMA	Australia Communications and Media Authority
ACPET	Australian Council for Private Education and Training
AITSL	Australian Institute for Teaching and School Leadership
APC	Australian Productivity Commission
ASQA	Australian Skills Quality Authority
AVETMISS	Australian Vocational Education and Training Management Information Statistical Standard
BYOD	Bring Your Own Device
CK	Content Knowledge
DER	Digital Education Revolution
DRM	Digital Rights Management
ICT	Information Communication Technology
ISTE	International Society for Technology in Education
LMS	Learning Management System
MCEETYA	Ministerial Council on Education, Employment, Training and Youth Affairs
NCVER	National Centre for Vocational Education and Research
NETS T	National Educational Technology Standards (Teachers)
NUHEP	Non-University Higher Education Providers
NVELS	National Vocational E-learning Strategy
PCK	Pedagogical Content Knowledge
PD	Professional Development
PK	Pedagogical Knowledge
RTO	Registered Training Organisation
SMS	Student Management System

TCK	Technological Content Knowledge
TICS	Technology Integration Confidence Scale
TK	Technological Knowledge
TPCK	Technological Pedagogical Content Knowledge
TQ	TAFE Queensland
VET	Vocational Education and Training
VEETAC	Vocational Education, Employment and Training Advisory Committee (VEETAC)
WWW	World Wide Web

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.



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Chapter 1: Introduction

The proliferation of Information Communication Technologies (ICTs) such as smartphones and tablets has changed the way in which people live, work and learn. One example of this is the growth of internet and social media use in Australia. The Australian Communications and Media Authority (ACMA) has reported that as children aged eight to 17 grow older, the ability to go online is a *central* activity for their social interaction, education, knowledge gathering and exposure to new experiences (ACMA, 2011). Sixty percent of teenagers aged 14 to 17 years use the internet to research and find information, a figure that increases to eight out of 10 for those aged 18 to 54 years. By age 17, the internet has become a thoroughly integrated part of teenagers' everyday lives (ACMA, 2014, para. 15). Without a definitive outline or standard as to what digital competencies a VET teachers should have this raises the question of how educators can capitalise on such powerful technological trends, as Australian youth are influenced by a constant desire to be able to access information 'on the go'.

The educational movement to integrate technology into learning has been highlighted as a priority for the current generation of learners (Ertmer & Ottenreit-Leftwich, 2010; Sadik, Sendurer & Sendurer, 2012). While the role of the 'teacher' remains important, the landscape in which teachers engage with technology has become problematic for organisations (Blin & Munro, 2008). Research suggests that the better trained a teacher is in the use of technology, the more likely it is that they will be able to successfully integrate ICT into their teaching delivery (Hsu, 2010). Therefore, it is evident that a teacher must feel confident in their ability to use technology in order to commit to its continued use in the classroom (Ertmer, Ottenbreit & York, 2007).

While Professional Development (PD) for teachers contributes to their commitment and desire to use technology in their teaching, PD efforts have been problematic. Approaches toward PD are often fragmented, disorganised and separated from the daily practice of teachers (Hawley & Valli, 1999). For example, within Vocational Education and Training (VET), the teacher is often taken out of the 'classroom' to undertake PD that is specifically relevant to their classroom environment, such as behaviour management. Therefore, researching the disconnect between the PD that is *required* and the PD that is *received* within Queensland VET will provide valuable insights into how future resources can be allocated.

In the context of the Queensland VET sector, this research project seeks to characterise and understand the digital capabilities of VET educators within TAFE Queensland (TQ). The core research premise is to collect baseline data about the Queensland VET sector teaching workforce with a focus on TQ which is the largest VET training provider that trains more than 180,000 students per year (TAFE Queensland, 2015). By establishing a baseline of current Queensland VET educator digital capabilities and identifying how PD programs are contributing to the increase of these capabilities, the research provides vital information for policy and practice for any Registered Training Organisation (RTO) across Australia that is interested in measuring and building the capability of its workforce. Using the well-established National Educational Technology Standards set by the International Society for Technology in Education and the Technology Integration Confidence Scale (TICS) developed by Browne (2007) as a guide the 39-question survey was developed. TICs comprises of 33 questions aligned to NETS-T and measures

self-efficacy (high or low) of a person in a particular task which is argued by Bandura (2006) as more reflective of whether they are able to complete the task and that they *will* take action. These questions were modified to suit a VET context. This is further elaborated upon in Chapter 3. This thesis also includes an investigation into how current PD opportunities address the development of these capabilities in order to meet the expectations of Australian youth undertaking VET.

Although previous studies with pre-service teachers in the Kindergarten-12 (K-12) (Archambault & Barnett, 2010; Krumsvik, 2008a), technical vocational education and training (Husin Chua & Hazri, 2012) and higher education sectors (Oster-Levinz & Klieger, 2010; Rienties, Brouwer & Lygo-Baker, 2013) have ascertained educators' levels of digital capability and how this can be measured, this study is significant because the Queensland VET sector is an educational context that has not been explored in current literature in relation to the measurement of VET teachers' digital capabilities.

1.2 Background and context

Skills Australia states that there has been an unprecedented shift in modes of delivery and practices to engage learners, transforming the way Australians live and work.

> The digital age is upon us …it provides untold opportunities to reach learners across the country and to engage younger learners who, as participants in the digital revolution at schools, will expect easy to access learning by using the web at a time and place of their choice (2011, p. 109).

This shift is predicted to continue, as VET will be "expected to equip workers of the future with the capability to adapt continuously and engage in learning throughout their working lives as they respond to changes in technology" (Skills Australia, 2011, p. 110). This in turn means that through PD, VET educators must be in sync with this shift in order to ensure VET remains relevant and viable as a sector within the wider educational institution community.

There are several definitions of PD discussed in literature. Definitions vary because requirements for various industries also differ. Truitt defines PD as "all activities engaged in by the personnel worker to improve the skills, techniques, and knowledge that will enable [them] to become an effective agent of education" (1969, p.2). Beeler refers to PD as "staff development", and defines it as "in-service continuous education that is designed to enhance capabilities, skills and knowledge of individuals in order to provide better service to their clients" (1977, p.38). For the purposes of this research, the definition of PD that has been adopted is that issued by the Australian Skills Quality Authority (ASQA). ASQA is the current national regulator for the VET sector, and their definition is the one that all RTOs must adhere to in order to remain compliant. ASQA defines PD as:

> Activities that develop and/or maintain an individual's skills, knowledge, expertise and other characteristics as a trainer or assessor. This includes formal and informal activities that encompasses

> vocational competencies, currency of industry skills and knowledge and practice of vocational training, learning and assessment, including competency based training and assessment" (2015, para. 34).

In addition, the term 'industry currency' goes hand-in-hand with VET PD, as it relates to the "capacity of an individual to continue to perform their job" (Clayton, Jonas, Harding, Harris & Toze, 2013, p. 7). VET educators have a professional and legal obligation to remain current, as they are training individuals who will move into occupations where knowledge and experience do not remain static.

There is a clear lack of current research to establish a baseline of VET educator digital capabilities using modern measures to inform PD strategies. However, there has been some research on the PD of VET educators in the Australian educational context and their use of ICT. One study in 2005 investigated the use of ICT in adult literacy education, and the challenges faced by VET educators to produce learners who are prepared to contribute "actively, critically and responsibly" to a society that is mediated by ICTs (Snyder, Jones & Lo Bianco, 2005, p. 7).

Through a series of case studies, the National Centre for Vocational Education Research (NCVER) found that adult literacy educators needed to fully understand the realities of modern ICT, and that, due to a lack of funding, access to ICT in a timely and appropriate fashion was an obstacle, even though having a centralised repository of shared resources would have been invaluable. Of particular importance, the study found that educators differed in their ability and willingness to use ICT. Most described their existing skills as self-taught, and preferred to learn this way and only seeking help when absolutely necessary (2005, p.10). In addition, the majority of adult educators felt that the rapid changes to technology meant they would always be in a state of requiring technical skills development. They also concluded that any PD program designed to target ICT capabilities required institutional ICT policies to support it if it were to have a chance at success, and that these policies should clearly identify financial implications and consequences to existing Information Technology (IT) infrastructures (NCVER, 2005).

Salter and Bound (2009) researched the use of a profiling instrument on a group of trade teachers in a public RTO in Tasmania to design the ideal PD intervention to target ICT capabilities. They found that even with the added benefits of ICT, teachers needed to undertake more "complex pedagogical reasoning than before in their planning and teaching" (p. 63). Salter and Bound further identified that this was "an area ripe for research with VET teachers" (2009, p. 63).

In 2008, the second volume of a series that addressed the changes and development in the delivery of VET programs in Queensland was released: Transforming Queensland VET: Challenges and Opportunities (TQV) (2008). Volume 2: Chapter 1 Using Smarter Technology: A Professional Development Model for TAFE Educators, emphasised the importance of effective PD for VET educators (full-time, part-time and sessional teachers, lead vocational teachers, educational leaders and tutors) to ensure they could meet labour market needs while operating in a diverse and complex marketplace.

The diversity of providers and educators in Australia's VET sector varies, as each state and territory operates in its own unique manner. As such, VET PD is more complex than staff development in the schools sector (Smith &

Lowrie, 1998). This research aims to fill the existing gap in current research on the digital capabilities of Queensland VET educators and the types of PD interventions that are effective in addressing their needs.

For the purpose of this study, the Queensland VET learning environment was chosen as a focus point. Although responses from private RTOs are included, the study concentrates on respondents from TQ, the largest public training provider in the state. Over the past three years, TQ has seen several key changes, including major VET reforms sandwiched between two changes of government, and the archiving of TQ's main learning management system (LMS) – which was used for more than seven years – and the introduction of a new LMS and student management system (SMS), all within a period of 18 months. Refer to Appendix H on page 139 for the timeline that highlights the major events of the past three years, which were pertinent to this research project and the circumstances in which it was conducted.

1.3 Significance

Teachers themselves need to be the driving force behind innovative change in teaching and learning, and their ability to integrate technology is largely dependent on the types and quality of PD they receive (Watson, 2001). Beyond a novelty value, effective PD in the use of ICT is crucial, and falls short if the human element is not developed equally with the use of technology (TQV, 2008). Therefore, this research sets out to further understand the TAFE Queensland VET sector workforce, which has not been widely researched in the Australian educational setting. Changing technologies will be a major driver of future PD; in order for VET educators to improve their ICT skills, their ability to apply them in the correct context and to respond to the technology preferences of their students will determine their future success.

In the VET sector, like its educational counterparts, the teacher remains the central figure in creating an engaging and effective learning experience. Therefore, the first steps toward changing current procedures and practices within PD are to identify the issues and gather data through research so that the problem can be clearly defined (Althaus, Bridgman & Davis, 2007) and addressed. This is a time in which the education industry is highly competitive. The unique context in which this research is conducted makes it a valuable contribution to the Queensland VET sector research landscape. It is intended that the findings will inform policy makers on how best to allocate PD resources to ensure the greatest return.

1.4 Purpose

Researchers have described the current levels of ICT integration in classrooms as "low level" (Selwyn, 2007, p. 84), indicating that the full potential of ICT in classrooms is yet to be harnessed and realised. The literature on PD is extensive, but often only within the schools and higher education context. In a review by Perkins in 1997 of PD programs for VET in the 1990s, it was clear that the potential of PD programs were yet to be fully realised:

> PD is not yet sufficiently appreciated, or planned and implemented, as a strategic activity. National and State PD programs more funded and structured to emphasis the distinctions between them, rather than to exploit strategies. A picture emerged of a fragmented system, … making PD a high-cost, low-result strategy for change within the training reform agenda (Perkins, 1997, p. 6).

Bredeson and Scribner (2000) have identified that the effectiveness of 'professional learning' is in fact *ineffective* in bringing about improved teaching and student outcomes. Teachers are also no longer able to ignore ICT and the role it plays in empowering learning, nor can they continue to rely on the skills and knowledge they graduated with (Perkins, 2009). VET educators need to be treated as adult learners who, through research, are understood to be "generally autonomous and self-directed, goal-oriented, relevancy-orientated, practical and seek recognition and respect for their prior experiences and knowledge" (Knowles, 1973, cited in Tafel, 2008, p. 25). Yet the majority of PD offered to educators is generic and classroom based (Tafel, 2008), is delivered by the institution administrators with little regard for the personalised requirements of the teachers (Borthwick & Risberg, 2008) and offers little to

no on- going support and follow up (Perkins, 2009). The effectiveness of PD can be widely debated within the VET sector (Harris, Simons, Hill, Smith, Pearce, Blakeley, Choy & Snewin, 2001), however, regardless of the result; PD remains a requirement under ASQA for any trainer or assessor operating in an RTO. As such, identifying what does or does not work is paramount to the allocation of resources within RTOs, in particular PD programs.

To help answer what types of digital competencies VET teachers should possess in order to teach in the 21st century, this thesis will investigate the following research questions:

> *How can the digital competence of VET teachers and trainers in Queensland be characterised?*
>
> *How are current professional development opportunities available to VET teachers and trainers addressing the development of VET digital competence levels?*

The research provides a profile of the digital capabilities of the TAFE Queensland workforce during a period of major technological advancement and the introduction of unprecedented reforms that have altered the way in which VET operates and contributes to the greater national training system. It also identifies the target group who would benefit most from a PD intervention that improves their uptake of ICT in educational delivery. This has been done by adopting a mixed methods approach focusing on the beliefs and experiences of Queensland VET educators as well as those in positions of influence regarding VET policy.

1.5 Research method

A mixed methods approach of interviews and surveys was chosen for this research to explore the unknown digital competency levels of Queensland VET educators. The focus of the research is on any person self-identifying as a VET teacher or trainer, a RTOs administrative and managerial staff is also integral to the adoption of ICT, and therefore they have been included in the scope. A random sample group of teachers and selected educational managers were chosen from (at the time) different public and private RTOs across Queensland. However, during the research, an amalgamation of all public training providers occurred, resulting in one statutory authority known as TAFE Queensland (TQ).

There were two simultaneous phases to the research. The first phase of data collection consisted of a voluntary survey that was available both online and on paper to VET educators across Queensland. The second phase of research involved voluntary interviews of educational managers from public and private RTOs.

1.6 Thesis outline

The thesis is divided into five chapters. Chapter One introduces the background and context for the research, followed by the purpose of the study and the research questions. Chapter Two presents a summary of the literature and research that has already been undertaken in the area of PD within the VET context. In Chapter Three, the research methodology is presented, with an explanation of the mixed methods approach to the survey and interviews, a discussion of the sample group of teachers who were randomly chosen from within the Queensland VET sector, and five educational managers from various RTOs who were interviewed to gain an understanding behind policy decisions regarding the PD of VET educators. The data and results from the survey and interviews are outlined in Chapter Four, while key findings, limitations, recommendations and conclusions are presented in Chapter Five.

Chapter 2: Literature review

The Professional Development (PD) characteristics and activities of Queensland Vocational Education and Training (VET) educators are largely unknown. This chapter outlines VET's place within the Australian education system and provides an overview of the VET workforce. The literature review also provides an examination of VET teaching identities, career pathways and qualifications, and comparisons with its counterpart, the schools sector. This is followed by an outline of the 21st century learning and teaching paradigm shift and digital competencies, with an in-depth look at PD practices within the VET sector. Finally, the chapter evaluates the capabilities and requirements for becoming an educator teaching 21st century skills and knowledge, focusing on public VET, university and the kindergarten to year 12 (K-12) sector context within Australia. It draws upon literature that debates and critiques the effectiveness of existing PD practices designed to address the digital competency of educators to successfully engage learners of the 21st century, and forms the basis from which the research questions are derived.

2.1 The place of the VET sector in the Australian education system

The Australian education system is made up of three major sectors: schools (including early childhood), VET and higher education (HE) which includes the Non-University Higher Education Providers (NUHEPs) (AQF, 2013). VET including Adult Community Education is provided through a network of public and private providers across eight state and territory governments. These providers include the Australian Government and industries (ASQA, 2015). The VET sector is a major contributor to the Australian economy, with more than 4,600 Registered Training Organisations (RTOs) (Training, Australian Government, 2015) delivering training to almost 1.8 million students (NCVER, 2015). In the past, each sector was generally responsible for their own level of qualifications, with schools ensuring a Senior Secondary Certificate of Education, and VET and HE delivering everything above (AQF, 2013).

The apprenticeships training model is unique to the VET sector. Apprenticeships are available to anyone of working age and do not require a secondary school certificate or any other qualification (Australian Apprenticeships, 2015). An apprenticeship is essentially a paid job with the protection of a formal agreement where the employer and apprentice sign a training contract. An apprentice is able to develop the skills and experience needed for the job in over 500 occupations, and upon completion receives a nationally recognised qualification (myfuture.edu.au, 2015). The progression and assessment of apprentices is often overseen by a VET educator, which further solidifies the partnership between RTOs and industry. Apprenticeships are managed by trainers in RTOs, and governed by the relevant government departments in each state or territory (Australian Apprenticeships, 2015).

National standards are enforced by the VET Quality Framework to ensure consistency in the way RTOs operate (ASQA, 2015). Instead of following a set curriculum, the VET sector has training packages, which are

competency-based and developed by Industry Skills Councils. Training packages do not prescribe *how* the learner should be trained, but rather specify the skills and knowledge the learner requires to perform effectively in the workplace (ASQA, 2015). Training packages are made up of three components: units of competency, qualifications frameworks, and assessment guidelines which are updated through a process of continuous improvement to ensure they are responsive to each industry's existing and future needs (ASQA, 2015).

The qualifications delivered by universities and VET have resulted in the blurring of sector lines and objectives. In this literature review, higher education (HE) refers to the qualifications that are delivered by universities in Australia. Currently, some schools deliver VET-level qualifications, VET also deliver HE qualifications and HE providers deliver VET qualifications. Where there is a combination of vocational (skills-based) and HE (academic-based) education within the same institution, this is known as a 'dual sector' (Moodie and Wheelahan, 2009). The justification for creating a dual sector has been the changing nature of work, the need for workers to be multi-skilled and the Australian Government's acknowledgement of the importance of lifelong learning (DEST, 2002). These two sectors can be considered as parallel with different focuses, structures and funding arrangements. Although both use employment outcomes as measures, HE focuses on the pursuit, preservation and transmission of knowledge, while VET focuses on education and training for work (Harris, 2009). This difference also extends to the types and numbers of students and the disciplines they offer qualifications in (Karmel and Nguyen, 2003). Although the discussion of dual sectors is outside the scope of this literature review, it is important to understand that the scope of VET educators is no longer limited to competency-based training.

Teaching in VET usually occurs in an industry-based setting, such as at a construction site, kitchen, hospital or simulated workplace with as close to reality work conditions as possible. VET is often task-related, performance-based, 'just-in-time', self-regulated and usually concerned with enhancing the performance of a business, enterprise or organisation (Brennan & Hemsworth, 2007). In addition, synchronous and asynchronous learning tasks including online and action learning, shadowing and learner-centred approaches to teaching (Hillier, 2009) are managed by a sole teacher. This highlights the scope of skills, knowledge and expertise that a VET teacher must possess in order to successfully teach and assess a competency-based curriculum. The mix of skills required poses challenges and opportunities in attracting and retaining staff within the VET sector. It can therefore be seen that VET is a major contributor to the Australian education system. VET teachers also have a wide scope of responsibility and skills that can often change depending on the requirements of industry and workforce demands.

2.2 The VET teaching workforce

In 2011, the Australian Productivity Commission (APC) reported that better data on the VET workforce was required and it urgently requested more data from the VET sector, especially private providers (pp. XXVIII). In 2008, Mlotkowski and Guthrie reported that the total number of VET workers, public and private, was around one million, making VET a significant employer and contributor to the Australian economy. In general, there is an overall acknowledgement by the VET sector and the government that not enough is known about its workforce. The focus of past reporting has been on student completions, learner engagement and employer satisfaction

(Australian Productivity Commission, 2011). Although there have been recent changes to reporting requirements for all RTOs to publish all information about accredited training, these collections only began in 2014 (NCVER, 2015).

With a clear lack of information about the size and nature of the VET workforce both nationally and within states, what data is available is not comprehensive (Guthrie, 2010). In a workforce where many find themselves "*falling"* into it rather than *planning* on it, the sector has developed into a predominately older one. In 2006, the average age of those classified as VET teachers was 44 years, while in 2010, it was 49 (APC, 2011, p. XXXVII). The Australian Council for Private Education and Training (ACPET) further highlighted this issue in their 2010 report, stating that it is an accelerated problem as the workforce attracts older recruits. Compounding the issue is the fact that younger VET workers surveyed in a 2009 study by the NCVER (p.31) wanted to keep their options open and were planning to move on in the future. This means that as the workforce retires, there is no supply of workers to fill the knowledge and expertise gaps their retirement creates.

Simons et al. (2009) have outlined some possible reasons for certain trends in shaping the future of VET, including the fact that it is a largely casualised and ageing workforce. In 2010, it was suggested that those who were 30-40 when they first entered the sector would be approaching retirement age (ACPET, 2010). This would mean that a substantial volume of valuable experience and knowledge will be lost, with no clear national legacy plan in place. Clearly, this is an area that requires further research into staff retention, with the same depth and rigour as has been carried out in the schools sector. Until this uncertainty is addressed, the foreseeable detrimental effects of a retiring VET workforce may not be fully understood or anticipated.

VET is also often seen as a 'second career' for workers who have spent a significant portion of time in their chosen industry, a distinguishing feature when compared with teachers working in schools (Chappell & Johnston, 2003). The sector requires its educators to have extensive industry experience before moving into 'teaching' (Dickie, Eccles, Fitzgerald, McDonald, Cully, Blythe, Stanwick & Brooks, 2004). For example, those who have worked in manufacturing and construction tend to consider becoming a VET teacher as a stepping-stone to retirement after they have 'gone off the tools' (APC, 2011). This means that being a VET teacher tends to not be seen as a 'destination career' for school leavers or university graduates, but rather a pathway for older workers.

Teachers in VET have distinctive career identities that are closely intertwined with their industry experience. The different educational identities between school and VET teachers require an exploration into whether the two knowledge bases should be considered as being the same (Chappell, 1995). It would certainly be unwise to declare that one has nothing to do with the other (Robertson, 2008). There can be much beneficial cross application of knowledge and experience from both streams without threatening the status quo. For example, despite the VET sector's competency-based requirements, it serves students from a larger diversity pool than those in schools. Furthermore, the teaching experience of imparting knowledge and skills may not significantly differ and this often results in a 'dual identity' for VET teachers (Palmieri, 2004). In this context, diversity within VET can be seen in the cohorts of students. The sector caters to mature-aged students with established careers and to those who have just left school and lack any work experience. The diversity also extends to the teaching faculty within VET, with a

mix of professionals coming straight from industry with little to no prior teaching experience and vice versa (Foley & Smith, 2002).

The motivations for choosing a career in teaching have been researched at length within the schools context (Manning & Patterson, 2005; Collinson, Killeavy & Stephenson, 1999; Rikard, 1999). Many of the studies were initiated in the United States (Alexander, Chant & Cox, 1994), such as Pop and Turner (2009), who found that social influences including family, friends, former teachers, major life events, job benefits and whether the individual had children were major factors in the choice to enter the teaching field. Less is known about these motivations within VET; however, some assumptions about the similarities can be drawn. In particular, the fact that reasons for entering the profession probably vary depending on the context and time. Around forty years ago, the reasons were less social – teaching was seen as more of a 'stable and secure' profession and something to 'fall back on' (Haubrich, 1960). This understanding has since been countered by more recent research by Richardson and Watt (2006), which stated that teaching, as a 'fall back' career was the lowest rated motive in their research findings.

The altruistic desire to bring about social changes for 'good' has also been cited many times as a reason to become a teacher (Jantzen, 1981). This is also reflected in the VET sector, with one of the primary motivations for individuals to move into VET being a passion for teaching and students (Black 2005; Harris et al., 2005; Chappell & Johnson, 2003). Beliefs regarding the transformative nature of education and the ability to touch people's lives are common in all teachers (Palmieri, 2004). The development of the psychometrically sound *Factors Influencing Teaching Choice* scale by Watt and Richardson (2007) helped address this need in schools by assessing the primary motivations of teachers to support decisions that improve retention. There is no equivalent scale developed to measure the motivations of VET teachers in Australia. This is not to say it does not exist within VET, just that it has not been published. Thus, due to the differences in measures and contexts of research into what motivates individuals into the profession, strict comparisons and reliable predictions about the workforce are difficult to make (Watt, Richardson, Klusmann, Kunterm Beyer, Trautwein & Baumert, 2012).

There is also limited academic scrutiny about the qualifications held by the VET workforce. What is available suggests that public RTOs are generally staffed by more qualified teachers than other providers (Mlotkowski & Guthrie, 2010). Qualifications in the VET sector are a complicated issue. An individual who comes from industry is able to teach within the sector immediately *without* attaining a Certificate IV in Training and Assessment, so long as they are supervised by another teacher who holds the qualification (Australian Skills Quality Authority, 2015). Even those who hold an HE qualification still need to attain the Certificate IV in Training and Assessment to be able to 'teach' in the sector, or seek out credit through the recognition of prior learning process.

Despite a lack of factual data in the Australian context, UK and USA research has shown that one in five teachers are expected to leave the profession within three years of commencing (Henke, Chen & Geis, 2000; Johnson & Birkeland, 2003). Even though teaching is considered a valued occupation in many developed countries such as Australia, the USA, the UK and many European states, these countries have experienced great difficulties in attracting, recruiting and maintaining effective, high quality teachers in recent years (Liu, Kardos, Kauffman, Preske & Johnson, 2000).

Along with schools, the VET sector is facing workforce issues through the loss of teachers by attrition and retirement (Skilbeck & Connell, 2003). This will result in a substantial cost to the community and put additional pressure on those teachers who remain (Schuck, Aubusson, Buchanan & Russell, 2012). The accuracy of figures is problematic, as state and territory education departments gather data but do not publish it (Buchanan, Prescott, Schuck, Aubusson, Burke & Lourviere, 2013). In Australia, universities offer teacher education qualifications in graduate and undergraduate modes which vary in duration. Graduate degrees or diplomas usually require only one year's full time study and sometimes two years (Skilbeck & Connell, 2003), which is quite short in comparison to the four to five years required for an undergraduate teaching degree. In addition to attracting students directly from school, the K-12 sector also attracts individuals known as 'career switchers'. They generally come from an established career in another field but have made the decision to commit to teaching as their new career and therefore have a better sense of themselves and a level of maturity that is germane to teaching (Resta, Huling & Rainwater, 2001).

Much like those within the VET sector, these career switchers come from 'industry' into school teaching. They must also learn to transfer their skills and knowledge and gain new ones, such as pedagogical underpinnings for the schools context (Grier & Johnston, 2012; Eifler & Potthoff, 1998). Priyadharshini and Roberston-Pant (2003) have used a deliberately broad definition of career switchers to include anyone who identifies as having entered teaching in a later stage in life. Here, school-leavers who move into the teaching profession are aged 19 to 20 whereas the age for graduates is 25 to 26 (Richardson & Watt, 2006). These career switchers have been highlighted as ideal candidates to recruit in an effort to improve the quality of education offered in schools because of the experiences they have gained from previous work (Graham, 2004; House of Representatives Standing Committee on Education and Vocational Training, 2007). However, research suggests career switchers do not always make quality teachers. For example, an accountant who becomes a mathematics teacher may not be adept in the curriculum areas of the subject (Halladay, 2008). Similarly, within the VET sector, although the idea of an experienced individual coming into teaching may seem sound, the reality is that this expert knowledge is no guarantee of their ability to apply it in an educational context.

As the baseline qualification to teach in VET, there have been ongoing concerns about the rigour and quality of how the Certificate IV in Training and Assessment is delivered by RTOs (Halliday-Waynes & Misko, 2013). Of particular concern is the ability for RTOs to offer the qualification in short duration, which can be coupled with insufficient training, leading to poor skills acquisition for VET teachers. This can lead to negative long-term behaviours and habits that are difficult for organisations to correct via PD. In 2004, the NCVER found that most VET staff do not hold specific qualifications in education and training, and that those who worked *outside* VET were more likely to hold a Bachelor or postgraduate teaching qualification. This means that although the individuals who enter the VET workforce are highly qualified in their chosen field either through experience or formal training, they are usually not well-trained or experienced in actual 'teaching' and educational pedagogy. It is evident that the main pathway to becoming a VET teacher is from 'industry'. Data on how individuals make the decision to transition to this career is crucial to forecasting and meeting the future demands of the VET workforce (Simons et al., 2009).

In Australia, schools teachers need to follow the prescribed registration requirements of the state or territory they intend to teach in after obtaining the prescribed qualification (AITSL, 2015). In comparison with VET, it can be argued that the schools teaching workforce is made up of individuals with a stronger focus on educational pedagogical knowledge due to the mandatory nature of obtaining an education centric qualification. VET, on the other hand, values industry experience over a teacher's ability to teach (Bender, 2011). To further highlight the differences outlined by Wheelahan and Moodie (2011), Table 2.1 (refer to Appendix D, page 135) distinguishes the two teaching areas, and takes the Queensland models as an example.

Although there has been a large body of research into the recruitment of specific individuals such as career switchers in schools, this specificity is not possible in VET due to the lack of data, which has either not being collected, or not been made available. Of particular importance between the sectors is age. As stated above, school 'graduates' or 'career switchers' tend to be aged 25 to 26, whereas in the VET sector, the average age is 49. This has workforce ICT capability consequences, which will be discussed further. Depending on their chosen pathway, both groups are now faced with the very realistic challenge of integrating technology into their teaching and learning practices.

2.3 21st century learning and the teaching paradigm shift

Teachers must now possess the skills to ensure that 21st century knowledge, skills and abilities are evident among their students to meet the needs of the modern global economy (American Association of Colleges of Teacher Education, 2010). Teachers, principals and school administrators have had new demands placed on them requiring them to redevelop school-wide ICT integration strategies to deliver on the 21st century skills and knowledge agenda (Hew & Brush, 2007).

Ensuring the development of high quality (21st century ready) teachers and the integration of ICT into education is not a new challenge. In 1992, the Vocational Education, Employment and Training Advisory Committee (VEETAC) commissioned the Staffing TAFE for the 21st Century Report which highlighted the many issues faced by the sector in developing an adaptable and modern workforce. One of which was the application of modern technology practices. Since the 1980s, educators and researchers have taken up the challenge with varied levels of success (White, 2008). Developments have come in smaller increments. For example, in 1989, Robert Cailliau and Tim Berners-Lee, also known as the inventors of the Internet, proposed the use of computers to manage documents at a conference in Switzerland. They conceived a service that could share files, information, graphics, sound files and more – a vision which ultimately resulted in the birth of the World Wide Web (WWW) (Gillies, 2001). The WWW then evolved through leaps and bounds with the advent of social services including Google, MySpace, Facebook and Twitter, which pushed forward ICT from 'desktop applications' to the ability to engage, contribute and publish information in different formats, also known as Web 2.0 (O'Reilly, 2005). This increased development in human interaction has resulted in a period where our verbal and written communication is largely done electronically, globally and more personally than ever before, resulting in profound implications for education, business and research (Bosco, 2006).

The Australian Institute for Teaching and School Leadership (AITSL) has developed seven Professional Standards for Teachers (Standards) through extensive research, expert knowledge and analysis and review of standards in use by other teacher registration authorities, employers and professional associations. The goal of the standards is to "define the work of teachers and make explicit elements of high-quality, effective teaching in 21st century schools that will improve educational outcomes for students" (AITSL, 2015, para. 1). These standards have been endorsed by the Ministers for Education in all states and territories and are part of a nationally consistent registration and renewal of teacher registration (AITSL, 2015, para. 9). The standards are organised into seven areas and categorised into the career stages the teacher may be in. Of particular importance are Standards 2.6[1] and 4.5[2]:

1. Know students and how they learn;
2. Know the content and how to teach it[1];
3. Plan for and implement effective teaching and learning;
4. Create and maintain supportive and safe learning environments;
5. Assess, provide feedback and report on student learning[2];
6. Engage in professional learning; and
7. Engage professionally with colleagues, parents/carers and the community (AITSL, 2015).

The ability of teachers to perform basic functions on computers is no longer considered as being digitally competent (Doyle & Reading, 2012). One of the ways in which this issue is being addressed in Australia is via changes to pre-service teacher education programs with the Society for Information Technology and Teacher Education (SITE, 2002) recommending three principles for the improvement of ICT in teacher education: technology should be infused into the entire teacher education program, it should be introduced in context and students should experience innovative technology-supported learning environments in their teacher educator program. Those who have struggled to learn about technology, or who tried to teach others to use it, becomes acutely aware that short exposures do not provide sufficient knowledge and skills for implementing technology into a classroom (Schrum 1999, p. 84). It is no longer enough to teach the next and future generations of educators in the ways they were taught, because they will live and teach with learners of a different age (Jacobsen, Clifford and Friesen, 2002). This means that the size, depth and duration of the ICT component of the chosen preservice program will largely determine the successful transfer of these skills. Preservice teaching programs must develop the same higher order skills that are expected in 21st century students so teachers are able to adapt to new and emerging technologies. As technology continues to change, the prevailing wisdom on how technologies should be used is also debated (Ertmer, Gopalakrishnan & Ross, 2001).

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[1] **Standard 2.6** Information and Communication Technology requires teachers to initially implement ICT strategies to expand curriculum- learning opportunities for students to leading and supporting colleagues within the school to select and use ICT with effective teaching strategies to expand learning opportunities and content knowledge for all students.

[2] **Standard 4.5** Use ICT safely, responsibly and ethically requires the review or implementation of new policies and strategies to ensure the safe, responsible and ethical use of ICT in learning and teaching.

The tracking of ICT skills among school teachers is a largely state and territory activity. In 2006, the Western Australian Department of Education released the *Teacher ICT Skills: Evaluation of the Information and Communication*

Knowledge and Skill Levels of Western Australian Government School Teachers report. It provided a valid and reliable assessment of the level and nature of ICT knowledge and skills among public school teachers. A similar initiative has been undertaken in Victoria, the *ePotential ICT Capabilities Resource*, which supports teachers to develop their ICT skills by asking them to complete a preliminary online survey to assess their capability within the framework (State of Victoria, 2015). Nationally, there have been large undertakings such as the *Profiles of Teachers in Selected Curriculum Areas: Further Analyses of the Staff in Australia's Schools 2013 Survey*, which provides information about schools' teaching workforces, areas of concern faced by the sector and their career intentions (Australian Council for Educational Research, 2013). Other useful national initiatives include the inaugural *2014 National Teacher Workforce Dataset*, which provides information on around 440,000 teachers' demographics, qualifications, registration status and current employment. In addition to pre-service programs, the Department of Education and Training in Queensland also contribute to the ICT development of the teaching workforce by offering a range of programs, including *The Learning Place Online*. However, the effectiveness and evaluation of these initiatives has not yet been published.

When comparing the 21st century teacher characteristics of school and VET teachers, it is clear that both sectors are struggling with the same challenges in slightly different contexts. For example, to teach in VET, the minimum qualification includes 'technology' as a key employability skill. However, this is covered in an elective unit that does not necessarily ensure VET teachers are equipped with the necessary skills upon completion. Well-established teachers have accumulated teaching habits from years of experience, so the development of their ICT skills is heavily reliant on PD. Federal Government policy on innovation and technology and the level of support and attention the VET sector has received has, in the past, been noticeably lacking (Toner, Marceau, Hall & Considine, 2004a). This is evident in the programs made available by the Department of Education and Training such as *The Learning Place* initiative. However, there is no current equivalent program for the Queensland VET sector workforce. This is not to say that these programs do not exist at the organisational level, but if they are being undertaken, it would appear to be happening outside the sphere of public knowledge.

The skills outlined in the training package are designed to allow VET teachers to 'get by' in the sense that they simply need the ability to mark assessments and deliver content electronically with no guidance as to what is expected in "using technology to enhance outcomes" (Training, Australian Government, 2015, p. 7).

Table 2.1: Comparing VET and schools information and communication technology standards of knowledge

VET (Training Package)	Schools (Australian Professional Standards for Teachers) (Standards)
- Using technology to enhance outcomes - Using student information management systems to record assessments - Identifying and organising technology and equipment needs prior to training - Using a range of software, including presentation packages	- Lead and support colleagues within the school to select and use ICT with effective teaching strategies to expand learning opportunities and content knowledge for all students - Review or implement new policies and strategies to ensure the safe, responsible and ethical use of ICT in learning and teaching

Educators cannot rely simply on their ability to integrate and use technology within the classroom. As far back as 1993, there has been acknowledgement that higher order thinking and skills development is required, as technology alone cannot restructure schools without incorporating technologies that have become the basic tools of business, industry and communication (Jordan & Follman, 1993). Although intended for a K-12 context, it can be argued that this would be relevant across all educational and training institutions. As stated above, the schools sector has more reporting (mandatory and voluntary) than VET. Attempts at reporting were made by the APC in 2011, however, since then, each state and territory's training system has changed. Annual tracking is required to fill in the knowledge gaps and shifts within the workforce. The data that is available to the schools sector can arguably inform more accurate and precise PD intervention programs for their staff to support the growth of their digital competencies.

In 2007, the Australian Government introduced the Digital Education Revolution (DER) scheme for the specific purpose of providing a computer for every secondary student in years 9-12, including equipping schools with high speed broadband (Department of Education and Training, 2007). The Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) stated that the consequences of the DER program would transform schooling by providing:

> Widespread access to, and effective use of, ICT in Australia's education and training sectors [which] has the capacity to create opportunities to transform learning and teaching environments that can improve education outcomes and increase social and economic participation across Australia. (MCEETYA, 2008, p.1)

The DER was implemented on the premise that by creating a technology-rich environment at schools to engage students, it would prepare them for 21st century learning and for life after school (Scanlon & Issroff, 2005; Zucker

& McGhee, 2005). This strategy has been largely successful across the globe as far back as 2005, as seen in Gulek and Demirtas's US study, which found that "there is substantial evidence that using technology as an instructional tool enhances student learning and educational outcomes" (p.9). This was further supported by Zucker and Hugs's work in 2008, also in the USA, where "students, teachers and administrators report that the use of laptops helps students learn important content" (p.593). A study by Grimes and Warshauer (2008, p. 317) focusing on a low socio-economic and largely Hispanic school in California reported, "the introduction of laptops has an important impact on students' access to and use of information and data in instruction and research". Closer to home, a Perth longitudinal study tracking the implementation of a one-on-one laptop program at a school for boys found:

> One-on-one laptop programs can be a doubled-edged sword. On the one hand, they can provide enhanced opportunities for student-centred learning where access to electronic resources along with communication and creative tools are ubiquitous. On the other hand, they can be antagonistic to the learning process seducing certain types of students to spend time on wasteful and even anti-social activities (Bate, MacNish & Males, 2012, p. 21).

While there are clear benefits to providing technology to learners, teachers and administrators, there are also disadvantages. These complications to technology implementation must be weighed and evaluated with the benefits in mind – particularly how they can enhance the teaching and learning experience.

A large body of research is available on what 21st century skills and knowledge 'should' be. After interviewing hundreds of business, non-profit and education leaders, Wagner(2010) identified several key 21st century skills, including collaboration across networks, initiative, entrepreneurialism, curiosity and imagination. Creativity has been identified as a particularly crucial 21st century competency; however there has been much difficulty in producing a universally agreed definition (Soland, Hamilton & Stecher, 2013). Due to the broad application of creativity and its value to entrepreneurship, it is considered a key 21st century competency by several organisations and scholars, including the OECD (2013), the National Research Council (Pellegrino & Hilton, 2012), the Hewlett Foundation (Conley, 2011) and the World Bank (Di Gropello, 2011).

The Australian Government was just one of many governments to introduce one-on-one computer schemes with the aim of driving educational change. The DER rolled out 911,000 laptops in early 2012, with all computers arriving with preloaded software, supported by interactive whiteboards and technical support for students and teachers (Nielsen, Miller & Hoban, 2015). The ultimate goal was to ensure that by instilling these skills in the next generation, they could compete on a long-term basis in the global economy (Vockley, 2008).

Although, the implementation of the DER was arguably sound, some results were not as ideal as intended. Research suggests that providing technology leads to engagement, particularly in science (Linn & Eylon, 2011; Jones & Issroff, 2007), because of the ability to access different types of information at any time (Traxler, 2010; DEEWR, 2008; Zucker & McGhee, 2005). In practice, however, students' reactions are not always as anticipated.

An Australian case study of two science teachers aged in their 40s found that although the teachers were competent and enthusiastic, the students themselves did not necessarily know how to use the computers beyond conducting internet searches, taking notes and engaging in social media. Furthermore, students were unsure as to what to write down, which required the teachers to think about what adjustments and instructions they needed to make in the classroom to make use of the technology (Nielsen et al., 2015; Rosefsky & Opfer, 2012). For example, simple technical issues such as labelling an image required the teachers to create standards on how big images should be and how to create tables, which often resulted in loss of confidence in students because they were unsure about how to complete tasks.

Teachers also found that while students did use the Internet to research, this often resulted in copying and pasting 'answers' without engaging with the content (Nielsen et al., 2015). It should be noted that in this particular study there was an assumption that the students had an underlying understanding and ability to use technology, as it had formed part of their earlier curriculum, for example in maths, where data sheets and drawing software was used regularly (Nielsen et al., 2015). The limited sample size of the study also makes generalisation of the results difficult. This disengagement and segregation of ICT for students (Clark, Logan, Luckin, Mee & Oliver, 2009) has been researched by others who found that students do not see smartphones and tablets as learning tools, but rather as tools for social networking (Nielsen Media Research, 2013).

Even though providing access to computers and other ICT helps to some extent in the development of 21st century learning in classrooms, the challenges that teachers face are more complex. The undeniable need to adopt ICT is certain, however, the systems in which they must operate are complex. The revolution will therefore be incremental rather than exponential (Cuban, Kirkpatrick & Peck, 2001). Teachers must now rethink the ways in which they manage and plan learning, troubleshoot on the fly and demonstrate competence in digital pedagogies first in themselves, and then construct scaffolding to support deeper levels of learning in their students (Simpson & Payne, 2004).

Certain efforts in schools and government have not always resulted in the intended outcomes. The development of 21st century skills remains a goal for all countries alike. In the USA, "laptops are essential to successful twenty- first century classrooms and schools…using technology in this way helps prepare our students for the jobs of today and tomorrow" (Maine Department of Education, 2009, para. 7). In Australia, the one-on-one DER program and associated ICT were designed to "prepare students for further education, training and to live and work in a digital world" (Commonwealth of Australia, 2011, para. 2). Those students, initially exposed to the now retired DER program, have completed their schooling and matriculated into the workforce or into higher education and training. When placed side-by-side, the differences between the 21st century skills required of VET and schools teachers are clear.

Attempts have been made at a national level to collect data on the e-learning uptake of VET teachers. Through the now defunct National VET E-learning Strategy (NVELS), previously known as the Australian Flexible Learning Framework, the annual *E-learning Benchmarking Report* was commissioned. It tracked twelve indicators

across RTOs across Australia (NVELS, 2005). Of particular interest were the three indicators that focused on teaching and training practices. These were: the percentage of teachers/trainers delivering units that use e-learning; the percentage of VET teachers/trainers who through e-learning have changed teaching practices in the design, development and delivery of units; and the percentage of VET teachers/trainers who believe increased access to e-learning resources has improved teaching and learning outcomes (NVELS, 2005). The *E-learning Benchmarking Report* was made available annually from 2005 to 2011 and in 2013, but does not provide sufficient detail on the digital competency of VET teachers. Therefore, the timing and content of this research project, which attempts to consider how to meet the demands of 21st century learners, is particularly relevant.

2.4 Digital competency of Queensland VET educators

The digital competencies expected of VET teachers are much lower than those expected of their school counterparts, as they are only required to engage at the basic level as opposed to expanding their skills and expertise into wider policies and strategies. "Professionals of the 21st century think and act differently than those of previous centuries, due in part to the radically different tools they use to perform their jobs" (Ertmer and Ottenbreit-Leftwich, 2010, p. 255). The digital expectations of learners who've benefited from the DER are beginning to arrive in workplaces, VET and higher education, the impact of which requires scholarly attention. Therefore, further research is required to determine any long-term benefits of and/or the success of these one-on- one technology programs – in particular, how they have affected the skills of the teachers in schools, VET and higher education who have had to learn and teach with ICT simultaneously.

With the invention of the internet in 1992 (Harasim, 2000) and the accompanying newfound capabilities of sharing information and rich media has emerged new possibilities for education. Even though email was initially the main form of networking communication, the idea of 'computer conferencing' became the core of 'online learning' by allowing interactions to occur from great distances and locations (Hiltz & Turoff, 1978). The HE sector embraced the new technology, particularly in the 1980s, when there was an explosion of creative applications of computer conferencing, which developed into online collaborative learning (Khan, 1997).

The VET sector has always provided correspondence learning support to regional and rural learners; however, they have been slower on the uptake of 'online learning' compared with HE. For example, in 2001, Peters and Lloyd reported that only 0.5% of TAFE graduates had used online training, with the highest levels of online training (60%) by graduates who resided in capital cities. This is compared to 19% of HE students in 2010 studying either externally, online or multi-modally (Australian Bureau of Statistics, 2010). According to the Australian Bureau of Statistics (ABS), in 2008-09, around 84% of people aged 15-17 had accessed the internet from an educational institution, though only 39% of them had used it for education or study purposes. However, among those who accessed the internet from home, 66% of the 15-24 year olds did so for education purposes, which the ABS suggests is due to the "greater likelihood of these age groups engaged in secondary or tertiary education, as well as the increasing importance of online learning tools in the delivery of education" (2011, para. These figures have grown substantially in VET since. The 2005 *E-learning Benchmarking Report* stated that 65- 70%

of surveyed VET students found that the e-learning in their course had increased their confidence and computer skill levels.

In 2013, 44% of students reported that the ability to learn online was a deciding factor for choosing a particular course and 20% said that it was a major factor in choosing their training provider (Australian Flexible Learning Framework, 2013, p. viii). There have been no national surveys like the *E-learning Benchmarking Reports* since 2013, which focused on the e-learning demands of those in the VET sector. Given the advances in education and technology during this time, the loss of this annual data on RTOs across Australia hinders our understanding of how to meet the online learning demands of learners. This is not to say that RTOs do not conduct and collect internal unpublished data with students and teachers. However, when it is not made publically available, gauging and comparing the progress of online learning in Australian VET is difficult. There is an undeniable growth and demand towards providing students with the flexibility of online learning, while maintaining the quality that is expected of VET providers. This task is compounded by the Australian Government's efforts to jump-start that nation's digital evolution by providing one-on-one technology to students in schools. This will ultimately result in students who are possibly more prepared for online learning than the VET teachers they encounter.

School teachers have a level of quality in their workforce that is not as evident in the VET system. For schools, a pre-service program is required. This generally takes the form of a graduate diploma or four-year bachelor degrees, which requires significantly more substantial levels of work and competency compared to the VET-required Certificate IV in Training and Assessment. The Certificate IV in Training and Assessment has formal guidelines that prescribe completion times– for example, a VET teacher could be working alongside a qualified teaching partner without ever needing to complete the qualification. In addition, the diversity of the individuals who enter the workforce coming from industry increases the complexity of the development of a benchmarked level of ICT skills, as this is largely dependent on which field they have come from. For example, if they have an engineering background, their ability to draft using software will provide an advantage over those from another field that traditionally does not require ICT, such as horticulture. Furthermore, approaching this challenge in preservice teaching programs only addresses the issue with teachers starting out in the profession.

The need for a compulsory e-learning component within basic VET training is evident in the baseline qualification. The training package for the Certificate IV Training and Assessment outlines eight core employability skills:

1. communication;
2. teamwork;
3. problem-solving;
4. initiative and enterprise;
5. planning and organising;
6. self-management;
7. learning; and
8. technology
    a. using technology to enhance outcomes, including online delivery and research using the internet;

b. using student information management systems to record assessments;
c. identifying and organising technology and equipment needs prior to training; and
d. using a range of software, including presentation packages.

(Training, Australian Government 2015)

The eighth employability skill is not covered by the seven core units, and can only be achieved by choosing an elective that focuses on using ICT for education and training. There is no data available on the number of VET teachers who have chosen an elective that focuses on ICT. As more than 780 RTOs (at the time of research) currently deliver this qualification, the data would be difficult to gather and collate (Training, Australian Government, 2015).

According to the requirements of Training, Australian Government, these are the core minimum digital competencies expected of a VET teacher upon completion of the Certificate IV Training and Assessment. Investigation into this area would be highly beneficial to understand how these digital competencies are currently being developed and tracked.

2.5 Professional development in teaching

The goal of Professional Development (PD) is to improve the skills of the educator and facilitate better work practices and standards, which ultimately benefit their students. If teachers are able to perform their jobs with confidence and satisfaction, they are more likely to motivate their students (Stoll & Fink, 1996). The *Australian Professional Standards for Teachers* (2012) notes that the purpose of engaging in PD is to ensure teachers are "continually refreshed in ways that ensure their ongoing effectiveness in promoting the learning that today's and tomorrow's young people will value and need" (p. 2). The OECD defines PD as "activities to develop an individual's skills, knowledge and expertise and other characteristics as a teacher" (2009, p. 49). This definition has been built upon by the Standards to create their own: "professional learning is the formal and informal learning experiences undertaken by teachers and school leaders that improve their individual professional practice and the school's collective effectiveness as measured by improved student engagement and learning outcomes" (AITSL, 2012, p. 5). School teachers have access to the Standards. There is also an *Australian Charter for the Professional Learning of Teachers and School Leaders,* which nurtures a nation-wide, high-achieving and vibrant professional learning culture (AITSL, 2014, para. 3).

Students' levels of achievement are related to the quality of instruction they receive from their teachers. Any PD program that helps to improve teaching quality must therefore be of upmost importance (Kuijpers, Houtveen & Wubbels, 2010). While PD is treated as an important part of being a teacher, there is a large body of research that suggests PD activities are ineffective in bringing about improvements in teaching and student outcomes (Bredeson & Scribner, 2000). Many survey-based studies (Corcoran, 1995; Supovitz & Turner, 2000; Ingvarson, 2003), have identified that the majority of PD undertaken generally involves unfocused, fragmented, low-intensity activities – such as short-term workshops, has little to no follow up and is thus unable to gauge the needs of teachers.

Conversely, other researchers have found that PD can influence a teacher's attitudes towards technology (Shaunessy, 2005) and has the ability to provide teachers with the knowledge and capability to use technology in the classroom (Fishman & Pinkard, 2001). More research is required to understand why current approaches are problematic and how the resulting issues can be addressed.

In VET, different motivations resulting in decision-making within careers will influence the type of PD teachers require to remain relevant educators. There is a noticeable lack of research around this topic in VET, possibly due to the differences in the established career pathways between a school- or VET-based teacher as previously discussed. Recruitment of VET teachers is still largely from 'industry' (Simons et al., 2009), as experts training and assessing learners on competency-based criteria makes sound sense. Other factors that influence the attractiveness of the sector to potential applicants include:

- the lack of requirement for national awards for teachers;
- low barriers to entry – the minimum qualification to teach is a Certificate IV Teaching and Assessment;
- no explicit standards for VET teaching; and
- no mandatory or voluntary registration of VET teachers.

Due to the higher than average hourly wages for casuals, the VET sector also attracts a particular part of the Australian demographic that prefers this type of employment (APC, 2011, p. XXXVI). This has consequences for the PD of VET staff, as some are brought on to do casual marking of students' work but are not involved in the delivery of content. These markers are less likely to be entitled to formal PD activities provided by the RTO.

There is no standard scheme or program to induct or support new VET teachers, and no national PD strategy. There is not yet a national VET professional body and data is yet to be collected, collated and published regarding measurable outcomes and overall satisfaction of experience (Wheelahan & Moodie, 2011).

The VET sector has key responsibilities in preparing students for work and life (Guthrie, 2010), which requires its workforce to be flexible, innovative and responsive (Skills Australia, 2011). Within the VET sector, PD is a compulsory requirement for an RTO to remain compliant. Teachers must demonstrate their industry currency through approved activities including participating in relevant PD, networking, personal development and accredited training, and returning to work in the relevant industry (ASQA, 2015). Industry current and relevant PD allows VET teachers to maintain and learn essential skills and knowledge so they can manage the continual changes in work caused by ongoing reform and increased competition in the sector (Harris et al., 2001).

Flexible modes of delivery including e-learning offered by their employer mean VET teachers are now required to be skilled in the appropriate educational technology. More crucially, they need to know how to incorporate technology in their training and assessment practices in the most effective way possible (APC, 2011). Two key industry groups have further highlighted this issue at a national level within government. In order for VET educators to match the demand for e-learning and blended learning, they themselves must have – or have the ability to develop – the higher order skills required. These skills help them to know and understand how, what and when

to use technology to complement their students' learning experiences and ensure quality outcomes (Flexible Learning Advisory Group, sub. DR99, 2011). This was further highlighted by Technical and Vocational Education and Training Australia's (TVET Australia) submission to the APC, which stated that "transformative and innovative ways for learning and assessment" were all part of the shift of focus from traditional teaching styles to those that work in an "online or flexible environment" (TVET Australia, sub. 56, 2011, p. 10).

The clear advantage that the schools sector has over VET is a nationally endorsed and established charter that clearly outlines what is expected of teachers in their PD activities. This type of support, structure and direction is desperately lacking within the VET sector. The schools' charter is soundly supported by frequently asked questions, factsheets, performance and development frameworks, stimulus cards and guides to aid teachers and their schools (AITSL, 2014).

Comparisons of PD approaches are difficult when there is more data available about the schools sector and little academic scrutiny on the specifics of VET workforce PD activities. The kind of data that the schools sector have on-hand includes types of professional learning they use most often, as well as types of learning experiences that have had the greatest impact on their practice. This is further broken down into specific activities including courses and workshops, mentoring, peer observation, conferences and seminar attendance, and is collected and shared across all states and territories (AISTL, 2014). Consultation, discussion and changes to policy on teacher performance are made possible due to the attention the schools sector has focused on teacher quality. For example, in Queensland, performance reviews of teachers were largely voluntary and ad hoc, resulting in the 2015 introduction of compulsory 12 month performance plans for every teacher, with ongoing feedback and support from principals and school leaders. The plan includes reflection and goal setting, professional practice and learning, feedback and review (Queensland Government, 2014, para.10). This could also be applicable within VET, but is a not a mandatory requirement. There is no doubt that the VET workforce would greatly benefits from the same level of concern, support, attention and resources, as well as a cohesive PD strategy or charter and mandatory reporting requirements, as that available to the schools sector.

This research project attempts to address the policy and teacher skills gaps, and the lack of data on the evaluation and inclusion of digital competencies of VET educators, with a particular focus on PD opportunities within the VET teacher workforce.

2.5 Research questions

In Australia and globally, the impact of ICT has resulted in a major shift in the way teachers think about, develop and deliver learning across the education sector (Moyle, 2010). The effects of this are keenly felt across VET, as highlighted where learners have benefited from the DER. These learners are now moving into training by teachers who have not had the same advantages or experiences with ICT. Yet the Australian Government and wider community expect that teachers will possess the ability to instill 21st century skills and knowledge in the next generation of learners in order to meet the demands of the global economy (Vockley, 2008).

Unlike the schools sector, VET is faced with unique obstacles due to the diversity of its workforce and learning cohorts, as well as the support structure provided by the Australian Government. It is evident, as expected, that schools tend to garner more attention and governance, which has resulted in national measures including the registration of teachers and the tracking of their performance through initiatives such as NAPLAN. However, quality assurance built into VET occurs via training packages and the requirement that teachers undertake the Certificate IV Training and Assessment. This standard is somewhat undermined by the delivery of the qualification, as there is no shared consistency in duration and/or assessment (Halliday-Waynes & Misko, 2013). Paradoxically, it is this flexibility of delivery and assessment that contributes to the success of the VET sector. However, it also compounds the issue of creating PD that meets the requirements of a rapidly ageing workforce (Simons et al., 2009). With sector-wide acknowledgement about the lack of reporting and information on the VET workforce and their PD activities (Guthrie, 2010), there can be no large scale understanding of the size and scope of issues or problem which emerge, and no progress towards realistic and coordinated solutions.

Therefore, this thesis aims to contribute to a shift in practice and policy by asking two crucial research questions:

> *How can the digital competence of VET teachers and trainers in Queensland be characterised?*
>
> *How are current professional development opportunities available to VET teachers and trainers addressing the development of VET digital competence levels?*

As noted previously, NVELS have attempted to track e-learning in VET. Unfortunately, however, the *E-learning Benchmarking Report* questions did not relate to identifying the digital competency of VET teachers. The research questions at the core of this project therefore aim to provide a clear understanding of levels of 'digital competence' among VET teachers. The teachers' completion of the 'self-assessment/evaluation' developed for this study illustrates competencies and the range of pedagogy that VET teachers employ in their classes. As highlighted by the APC, more quality data on the VET workforce is required, and so this research has also gathered demographic information regarding age, gender and length of time in the sector. It builds information on the specific types of PD activities that the VET workforce is undertaking and, through semi-structured interviews with key VET educational managers, provides valuable insights into the key drivers, beliefs and motivations behind organisational decisions and their impact on the individuals who work in them. The research methodology is outlined in Chapter Three.

Chapter 3: Research methodology

A mixed methods research methodology was employed to investigate the Professional Development (PD) characteristics and activities of Queensland Vocational Education and Training (VET) educators. This chapter addresses ethical considerations and the limitations of the research methodology, as well as the mitigation strategies adopted. It also provides an in-depth look at the insider-researcher perspective and the two analytical frameworks used to develop and analyse the qualitative and quantitative data collection methods.

3.1 Researcher's role

Coghlan and Brannick (2010) state that the three main elements that must be managed in insider-researcher projects are: the tensions between closeness and distance with participants, the duality of roles (organisational and researcher), and the organisational politics that exist. Although Coghlan and Brannick's (2010) suggestions referred to work-based action research projects, the same principles can be applied here. As an insider-researcher, the decisions and judgements I made considered the workplace context first, as I understand the environment in which my peers work and the nature of my research. Asking questions of other employees – in particular concerning resource allocation decisions – could have easily been perceived as 'negative' or exposing the weaknesses of the organisation in which I was employed in. I therefore conducted research to verify whether an issue existed, the causes of the issue and how it could be addressed to the benefit of both the organisation and individuals.

As an insider-researcher, several considerations and decisions were made that affected the choice of methodology undertaken. An 'insider-researcher' is someone who belongs to the group they are researching (Breen, 2007). At the time of the research, I was a Senior Instructional Designer and was known to several of the survey and interview participants. It has been generally established that a researcher's experience, values, ideas and choices and their individual characteristics affect their "knowledge, experiences, preferences and established working relationships" (Holian & Coghlan, 2013, p. 404). As the VET sector appears particularly complex to outsiders, it was highly beneficial that I was part of a 'shared membership', as this helped to build rapport with interviewees and allowed me to delve deeper into particular issues and ask the right questions in the correct context (Silverman, 1997).

Possessing a thorough understanding of the workplace context in which the research was focused allowed me to navigate obstacles such as 'access' during crucial stages of the research. Generating interest and support to complete the survey was made possible by having previously worked with staff who were responsible for putting together organisation-wide communications. A working understanding of Registered Training Organisations (RTOs) built upon experience working in the sector also created allowances that would not normally be afforded to an outsider. For example, I was able to seek out key individuals in positions of influence (Bonner & Tolhurst, 2002), including those whose decisions impacted policy on the very subject matter of the research.

The formulation of questions was also benefited by my insider-researcher perspective. I was better able to craft

questions to elicit candid and genuine responses that contributed to answering the research questions. Furthermore, this perspective allowed for the development of questions with the understanding of the politics that existed in the workplaces (Unluer, 2012). For example, my knowledge of which segments of the organisation were publically supportive but internally reluctant in the uptake of Information and Communication Technologies (ICTs) allowed me to better target them with a paper-based survey rather than an online one.

The limitations of being an insider-researcher were also carefully considered, particularly when choosing interview candidates among a group that including those with whom I had a prior working relationship (DeLyser, 2001; Hewitt-Taylor, 2002). Developing set criteria that could be applied to the decision-making process alleviated whether or not the correct people were approached and asked to participate (refer to Table 3.3, page 50). The familiarity with interview participants posed a higher risk of losing objectivity than the survey (Unluer, 2012) due to the qualitative nature of the data collection method. This was mitigated by creating a set procedure (refer to Section 3.4.2 page 49) between the interviewee and myself, which was more formal than our previous interactions, and highlighted and distinguished that this was a researcher/participant relationship. Familiarity with participants was less of a concern when conducting the survey, as I could not personally recruit all participants individually. Instead, I relied on those who disseminated information throughout the RTO in their normal work roles. My explicit awareness of these issues helped develop a research design with strategies implemented to counter the possible limitations that could otherwise have occurred (Smyth & Holian, 2008).

3.2 Mixed methods research design

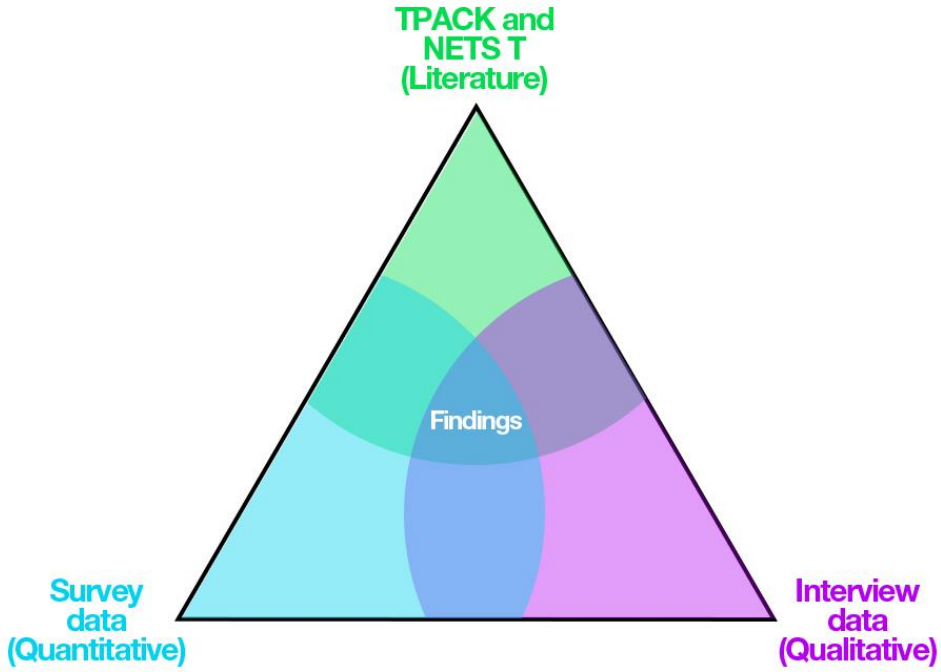
A mixed methods approach using a survey and interviews was chosen for this research. This included collecting, analysing and utilising qualitative and quantitative methods to understand a research problem (Creswell & Plano Clark, 2011). Instead of having to choose between different approaches, this approach allows the strengths and weaknesses of each approach to bridge the other (Harwell, 2011). When qualitative and quantitative approaches are combined "we have a powerful mix" (Miles & Huberman, 1994, p. 42). This ensures that different and rich perspectives are collected for analysis about a 'complex' phenomena (Greene & Caracelli, 1997), making it an ideal approach for the VET environment. The main basis for this decision was to allow for the collection of data that provided insights not available when using only qualitative or quantitative methods (Johnson & Turner, 2003).

Methodological triangulation was chosen to confirm findings and determine the completeness of the data collected (Heale & Forbes, 2013) from the mixed methods approach. 'Triangulation' was originally used in a measuring context by surveyors to locate objects in a space, relying on two known points in order to 'triangulate' an unknown fixed position in the same space (Mertens & Hesse-Biber, 2012). Here, the first two points of triangulation were the survey, which was used to collect quantitative data providing size and substance, and the interviews, which were used to bring depth and context to the overall research.

The third point of triangulation within this research included using established models for measuring digital competency in education, that is, Technological Pedagogical Content Knowledge (TPCK) and the National

Educational Technology Standards and Performance Indicators for Teachers (NETS T), which is discussed in the following section. By adopting this method, generalisations could be made using statistical data garnered from the survey to describe trends about a larger group of people (Creswell, 2014). Therefore, these quantitative findings are further contextualised by qualitative findings, and supported by the literature in order to increase the chance of accuracy of results (Creswell, 2014).

Figure 1.2: Methodological triangulation strategy adopted



Specifically, the research was triangulated using two concurrent approaches:

Approach 1 (Survey): A 39-question survey was formulated with close-ended questions using a Likert scale to gain maximum quantitative information from a large group of people in a short period of time. This approach helped to address Research Question 1 by asking VET educators how confidently – or not – they felt towards particular scenarios and interactions with ICTs. In addition, participants were asked about their PD experiences and given opportunities to expand upon their answers in freeform fields through open-ended questions. This contributed to addressing Research Question 2.

Participants were given a period of six months (October-April) to complete the survey, as VET educators' schedules are often in-sync with school terms and holidays. This provided enough time for the teachers to work around the 'heavier' periods leading up to holidays. Surveys were an ideal tool to gather a large sample of data from the VET sector, and allowed for a mix of quantitative and qualitative questions and responses. This approach also allowed the generalisation of the findings to the wider population (Morrison, 1993), including VET sectors in other states and territories. The survey questions were developed using existing models of measuring the digital competency of educators in schools, and adapted for a VET context. This is elaborated upon in the following

section.

Approach 2 (Interviews): Interviews with five key VET educational managers using seven open-ended questions were used to generate discussion. The interviews were an investigative instrument that allowed the drawing out of the 'big picture' to address the core issue of Research Question 2. The interview questions were designed to elicit responses that would reveal the drivers and reasoning for strategic decisions that directly influence how resources are allocated for PD in RTOs. The interviews provided a 'managerial' view which, when combined with the results from Approach 1, contributed to a more complete picture of what was being investigated. According to Kvale, interviews allow researchers to see the participants as more than just statistical data, and take on the perspective that "knowledge is generated between humans, through conversations" (1996, p. 11). Kvale further argues that an interview is an "interchange of views between two or more people on a topic of mutual interest" (1996, p. 14), and is central to human interaction for knowledge production. Key educational managers from high-level government positions within the Department of Education, Training and Employment, Training and Employment (now Department of Education and Training) and RTOs (public and private) were chosen as ideal interview participants who could provide unique perspectives on PD within the workforces they operated in. The models adopted for the survey also influenced the interview questions, however results for the interviews were thematically analysed as discussed in Section 3.4.3.

3.3 Survey

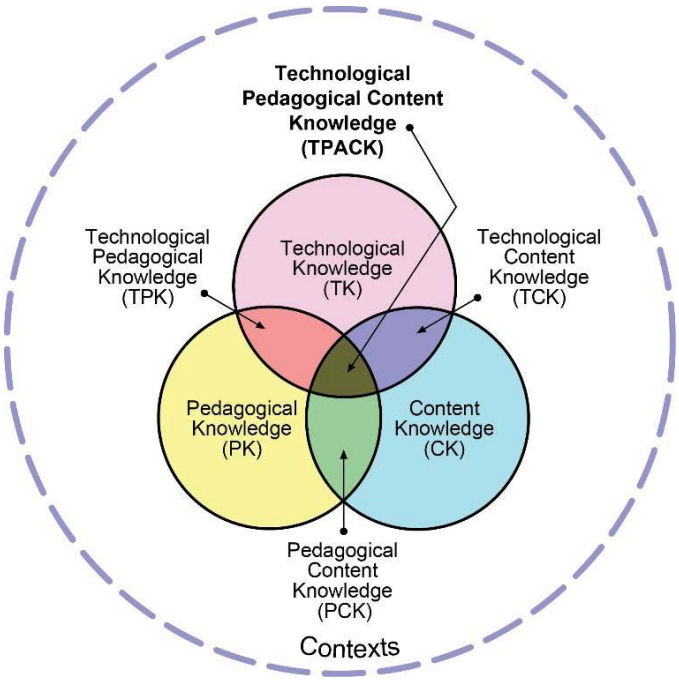
Surveys are a well-established and familiar data collection tool for gathering information about participant behaviours, attitudes and beliefs regarding the topic under investigation (Bulmer, 2004). The convenience of the tool itself was advantageous, as VET providers, including the one in which I was employed, conduct regular surveys to gauge organisational issues such as employee satisfaction.

The design of any survey is crucial to ensure that the data collected is what is required (Creswell, 2003; Sarantakos 2005). The risk is that the formation of a survey could result in responses that do not answer the posed research questions. Elements from two particular standards and measures of digital competency were therefore consulted in the design of this survey (refer to Appendix A, page 127). Appendix A highlights the 'gap' in research on the digital competence of VET teachers, which this research project helps to fill. The 'Standard/Measure used' column of the table in Appendix A shows the different digital competency models of measurement for educators. Although this is not exhaustive, a specific tool developed for the Australian VET context to measure teachers' digital competency could not be identified. Two tools that were relevant to this study were Technological Pedagogical Content Knowledge (TPCK) and the National Educational Technology Standards and Performance Indicators for Teachers (NETS T), developed by the International Society for Technology in Education (ISTE). These models will now be discussed:

Technological Pedagogical Content Knowledge (TPCK): TPCK was designed to identify the 'nature' of knowledge required by educators for integrating technology into their teaching and delivery (Koehler & Mishra,

2009). It is an extension of Shulman's work on pedagogical content knowledge.

Figure 1.3: TPCK model



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TPCK is a solid model to base survey questions on because it takes into account the "complex, multifaceted and situated nature of teacher knowledge" (Koehler, 2011, para. 1). The intersection between TK, CK and PK takes into consideration the relationship between content and technology in the setting of teaching and learning. This means that technology is not integrated for technology's sake, but is integrated with pedagogy supporting learning in mind. According to Schmidt, Baran, Thompson, Mishra, Koehler and Shin, "effective technology integration for pedagogy around a specific subject matter requires developing sensitivity to the dynamic (transactional) relationship between all three components" (2009, p. 123). TPCK has seven components to its framework; of most importance to VET is Content Knowledge (CK) due to its competency-based nature (Schmidt, Baran, Thompson, Mishra, Koehler & Shin, 2009).

1. **Technological Knowledge (TK)** – refers to knowledge about various technologies ranging from low-tech technologies such as pencil and paper to digital technologies such as the internet, digital video, interactive whiteboards and software programs.
2. **Content Knowledge (CK)** – is the "knowledge about actual subject matter that is to be learned or taught" (Mishra & Koehler, 2006, p. 1026). Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas. In VET, most teachers are the subject matter and pedagogical experts in the area in which they teach; however, as is the case for other teachers, the integration of technology sometimes overshadows the importance of content and pedagogy (Herrington & Kervin, 2007).
3. **Pedagogical Knowledge (PK)** – refers to the methods and processes of teaching and includes knowledge in

classroom management, assessment, lesson plan development and student learning.

4. **Pedagogical Content Knowledge (PCK)** – is the content knowledge that deals with the teaching process (Shulman, 1986). PCK is different for various content areas, as it blends both content and pedagogy. The goal of PCK is to develop better teaching practices in the content areas.
5. **Technological Content Knowledge (TCK)** – refers to the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using a specific technology, they can change the way learners practice and understand concepts in a specific content area.
6. **Technological Pedagogical Knowledge (TPK)** – is the knowledge of how various technologies can be used in teaching, and the understanding that using technology may change the way teachers teach.
7. **Technological Pedagogical Content Knowledge (TPCK)** – refers to the knowledge required by teachers for integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies.

National Educational Technology Standards and Performance Indicators for Teachers (NETS T): In addition to TPCK, ISTE has developed the National Educational Technology Standards and Performance Indicators for Teachers (NETS T, 2008), which were also used to develop the survey and interview questions. TPCK focuses on CK, PK and TK. Similarly, NETS T is a set of standards for "evaluating the skills and knowledge educators need to teach, work and learn in an increasingly connected global and digital society" (ISTE, 2012, p.1). NETS T is a model that allows educators to design, implement and assess learning using technology. It provides a set of standards including:

- **Standard 1. Facilitate and inspire student learning and creativity** – teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity and innovation in both face-to-face and virtual environments.
- **Standard 2. Design and develop digital age learning experiences and assessments** – teachers design, develop and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximise content learning in context, and to develop the knowledge, skills and attitudes identified in the NETS S (Students).
- **Standard 3. Model digital age work and learning** – teachers exhibit knowledge, skills and work processes representative of an innovative professional in a global and digital society.
- **Standard 4. Promote and model digital citizenship and responsibility** – teachers understand local and global societal issues and responsibilities in an evolving digital culture, and exhibit legal and ethical behaviour in their professional practices.
- **Standard 5. Engage in professional growth and leadership** – teachers continuously improve their professional practice, model lifelong learning and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

Where NETS T differs from TPCK is that it offers performance indicators that provide a spectrum that shows teachers where they are currently at and where they can improve. NETS T also incorporates the PD aspect of being an educator by requiring teachers to look at their professional practice, which echoes the purpose of this research project. Although both models measure different aspects of digital competency, neither was designed nor developed with the VET context in mind. As such, this research project incorporated elements of each model by repurposing and sampling them to create the survey and interview questions. The models were chosen because of their ability to garner the responses and data required to answer the research questions posed. Only the questions corresponding to TPCK and NETS T have been listed here – all other questions in the survey concerned demographic data about the participant (refer to Appendix B page 128 for the complete survey).

Table 3.1: Survey questions mapped to TPCK and NETS T

Key:

	Research Question 1
	Research Question 2
	Both

Survey question		Model referenced	
		TPCK	NETS T
4.	Are you mostly a PC or MAC user?		
6.	Do you own a laptop/notebook?		
7.	Have you ever used your laptop to complete the following tasks?		
8.	Do you own a tablet device? ie iPad		
9.	Have you ever used your laptop to complete the following tasks?		
10.	Do you own a smartphone? ie iPhone		
11.	Have you ever used your smartphone to complete the following tasks?		
12.	Your organisation is rolling out iPads and providing a 3hr demonstration. How confident are you that you can learn to use the iPad in 3hrs?	TK	S3
13.	How confident are you that you can effectively judge when and how to use technology to support your students' learning?	TPK	S3, 5
14.	A vendor suggests a program that records lectures with audio. How confident are you that you can evaluate its suitability to your teaching?	TPK	
15.	Your manager asks you to demonstrate a software program to your teaching peers. How confident are you that you can accomplish this task?	TK	S3
16.	How confident are you advising managers about purchasing educational technologies by evaluating their suitability to your teaching needs?	TPK	S2
17.	Trends stress high order skills like analysis, synthesis and evaluation. How confident are you in using technology to improve these in students?	TPCK	S1, 2, 3, 4
18.	Your students are using the internet to research a topic. How confident are you in providing them with a list of high quality websites?	TCK	S1
19.	Not all students have equal access to technology. How confident are you in identifying one or more students who might have access issues?	TK	
20.	How confident are you that you can model and teach safe usage of technology to your students, including internet safety?	TK	S1, 3
21.	How confident are you in using a learning management system at your organisation ie Moodle, Blackboard to deliver teaching and training?	TPK	S2
22.	How confident do you feel with supplementing your teaching and training with technology ie eAssessment, wikis, videos, images, smartphones?	TPK	S1, 2
23.	How confident do you feel about creating an eBook to supplement how you deliver teaching and training?	TPK	S3
24.	Do you feel as though you have adequate professional		

	development, training and support to integrate technology into your teaching?		
25.	Have you ever completed the following tasks?		
26.	Are you able to complete the following tasks using a word-processing program ie Word, Reader?		
27.	Do you use Facebook for personal or work reasons?		
28.	Do you use Twitter for personal or work reasons?		
29.	Do you have a LinkedIn account?		
30.	What other social media services do you actively engage in?		
31.	If you have answered 'YES' to owning social media accounts for work purposes, what do you primarily use these accounts for?		
32.	How confident would you be at facilitating a course completely online with minimal face-to-face contact with your learners?	TPK	
33.	What types of professional development (compulsory or non-compulsory) have you attended in the past 6 months?		
34.	How would you rate the professional development (compulsory or non-compulsory) opportunities you've attended overall?		
35.	What types of professional development opportunities would you like to attend?		
36.	How interested are you in attending professional development designed to improve your knowledge and expertise in the use of digital pedagogies?		S5
37.	How confident are you in providing support to students who ask for more flexibility in their learning? ie eAssessment, forums	TPK	S1, 2
38.	How relevant do you think digital competency is as an employability skill?		
39.	How comfortable would you be if a student were to demonstrate more expertise in the use of technology in the classroom than yourself?		

3.3.1 Survey validity

Validity of research refers to ensuring that what is being measured is *actually* being measured. Joppe (2000) defines validity in research as whether or not the instruments employed actually allows the researcher to hit the 'bulls eye'. In this case, do the survey questions help to answer the research questions posed? To answer this question, a small pilot test group of five individuals made up of VET educators, VET managers and individuals (who were no longer working in VET teachers, retired or had moved to more administrative/managerial roles) from outside the sector were asked to review the questions before they were finalised to provide feedback on their validity, as recommended by Creswell (2014, p. 415). Feedback was sought regarding whether the questionswere:

- Too wordy;
- Negatively worded;
- Jargon-laden;
- Mismatched;
- Unclear; or
- Not applicable to participants.

The questions were placed in an invite-only Google Docs, and participants were invited to provide written and verbal feedback. Participants were briefed on the purpose and background of the research and asked to pay particular attention to whether the language was appropriate for the intended audience. They were also asked if they believed the survey questions would help to answer the research questions. Some pilot participants also completed the survey as part of the feedback process. They recommended that:

1. Acronyms be spelt out fully;
2. The sequence of some questions be changed;
3. Freeform fields be added for elaboration for some questions; and
4. The wording of questions be edited slightly.

In addition to the pilot test, the mapping of the questions to TPCK and NETS T helped to connect the survey questions back to the research questions.

3.3.2 Survey recruitment

Although the research had a particular focus on VET educators, the survey was open to any person working within the Queensland VET sector. The three main targeted 'roles' within the sector were administrators, educators and managers, as all three contribute to the educational delivery process in their own capacities. Administrators were allowed to participate because the data from non-educational staff within the organisation could provide valuable insight into the digital competency of VET educators. It was identified that 'administrators' as a group also contribute to the educational delivery process within an RTO, as they are usually the first technical experts teachers contact when they encounter an issue. Capturing the managerial perspective beyond the chosen interviewees was also an important part of the research strategy. There is research to suggest that individuals holding higher positions within organisations are less likely to complete a survey themselves (Heckman, 1979; Fowler, 1993). This part of the research project allowed for the collection of data from this subset of the sample group who were not part of the interviews. A random probability sampling approach was taken using Creswell's (2014) diagram, the sample chosen for research can be identified below:

Figure 1.4: Random probability sampling approach

Adapted from Creswell, 2014

While other methods including purposive sampling and convenience sampling were considered, random probability sampling was chosen over other methods for pragmatic reasons, as it allowed for any persons within the VET sector to have an equal chance of being included in the sample (Teddlie & Yu, 2007). This was achieved primarily through distributing promotional packs to educational managers in various TAFE organisations. The packs contained links to promotional posters that could be downloaded, printed and posted on staff lunchrooms, small promotional cards that educational managers could hand out to teachers with a link to the survey website and printable versions of the survey, as well as 30 paper copies of the survey.

Online and printed versions of the survey were used to maximise the scope of the survey. The paper-based versions were distributed to educational managers known to me as members of a professional network involved in the PD of VET educators. They included, but were not limited to (before the amalgamation of TAFE Queensland into one statutory body):

1. South Brisbane TAFE;
2. Gold Coast TAFE;
3. SkillsTech TAFE;
4. Brisbane North TAFE;
5. Barrier Reef TAFE;
6. Australian Institute of Applied Sciences; and
7. Tropical North Queensland TAFE.

I also requested professional favours of teaching and administration staff I knew to forward the recruitment email and promotional posters to extend the reach of the survey and cast as wide a 'net' as possible. Although the online version was the primary platform in which responses were received, the paper-based version was distributed to educational managers to target VET educators whom they knew were less likely to complete the online survey. It was foreseeable that as the subject matter of the survey was about digital competency of VET educators, those who were not as technically competent would feel uncomfortable completing an online survey, yet it was

important to collect data from that perspective. The paper-based survey was also provided to satisfy those who simply preferred a paper-based version due to accessibility reasons ie visual or physical impairments.

The intention of the survey was to gain as many participants as possible. The survey was made available for a period of six months to ensure that all possible participants had the opportunity to complete it while complementing their delivery, marking and holiday schedules. Allowing participants to complete the survey at their leisure, as recommended by surveying experts such as SurveyMonkey (2013), ensured maximisation of potential participation.

As part of the recruitment process, an incentive was offered to participants who submitted fully completed surveys. This included a random draw to win of 1 of 3 $100 gift vouchers from a retailer of their choice. The anonymity of respondents were securely maintained, with the participant identifiable data (for prize draw purposes) separated from the actual research data. Participants were only required to enter contact details if they wanted to be included in the draw. Reminders were broadcast through TAFE bulletins as well as emails to educational managers. A total of five reminders were sent, at the rate of approximately one reminder every two-three weeks, with additional reminders sent more frequently as the closure date approached. A total of 206 survey responses were collected, with the results discussed in the next chapter.

3.3.3 Analytical approach to survey results

The survey results were analysed using descriptive and inferential statistics to test various hypotheses and identify trends and group differences. Statistical Package for Social Sciences (SPSS) was used to analyse the quantitative data collected from the survey questions.

3.4 Interviews

Interviews are one of the most common methods of data collection (Polit & Tatano Beck, 2004). Using a mixed methods approach, the adoption of interviews as a qualitative data collection tool complements quantitative data. This allows the researcher to encourage the interviewee to share descriptions of phenomena, while leaving it to the researcher to interpret or analyse the responses (DiCicco-Bloom & Crabtree, 2006). Interviews were chosen over other qualitative methods such as observation, as the practicality of conducting observations would not have generated data that described the *how* and *why* of interviewees' feelings about a particulate issue such as PD in VET. These types of inquiries are better investigated via interviews (Holloway & Wheeler, 2002).

By interviewing educational managers within the VET sector, I was able to gain access to data that may not be available to the public or to a non-insider-researcher. That is because sharing knowledge (even if it is for the purposes of research) about the inner workings and motivations behind strategic decisions and allocation of resources has the potential to expose weaknesses in an organisation. Strict confidentiality was therefore adhered to at all times during the interviews. Interviewees were asked to participate with the understanding that they would not be identified. Only demographic information such as the size of their organisation and their time in the VET sector were recorded.

This project interviewed five key individuals in unique positions who could influence policy and practice within their own organisations. By adopting a semi-structured and open-ended approach, the in-depth interviews were personal and intimate, allowing "open, direct, verbal questions [to] be used to elicit detailed narratives and stories" (DiCicco-Bloom & Crabtree, 2006, p. 317). An open-ended approach was chosen because the survey addressed closed questions, and this was an opportunity to uncover areas overlooked by the survey and to unpack more complex issues (Andrews, 2005) raised by the research questions. The interviews were designed to collect data that the survey could not, thereby strengthening the triangulation of both methods. The qualitative comments provided a richer image of how VET educational managers were contributing to the digital competency and PD of VET educators. Limiting the 'formal' interview questions to seven was a deliberate choice designed to ensure that all the 'issues' would be addressed while allowing for conversations to deviate should the answers lead to something 'interesting' (refer to Appendix C page 134 for interview questions). By asking interviewees to set aside an hour for the interviews, and limiting the number of formal questions, there was plenty of time to explore and tease out issues that arose naturally from the conversation.

The interview questions were provided to participants beforehand as part of gaining consent and establishing trust. When a researcher is more open and straightforward with participants from the beginning, it helps to set the 'right note' to the process (Ostrander, 1995). I also wanted to put the interviewees at ease by not 'surprising' them on the day, and to build on the goodwill and rapport established to encourage candid responses (Douglas, 1985). The interviews were one-on-one. Although it was originally planned that they would be conducted face-to-face, multiple scheduling conflicts ultimately meant that all interviews were conducted over the telephone. As discussed, participant identities were kept anonymous with only demographic details about the size of the RTO they worked in and their business title collected. This was done to ensure interviewees felt comfortable addressing sensitive issues such as the reasoning behind resource allocation decisions (Driscoll, 2011). The development of the questions was also designed to cover both research questions.

Table 3.2: Interview questions and relationship to research questions

Key:

	Research Question 1
	Research Question 2
	Both

	Interview question
Q1.	How would you characterise the impact of learning technologies and its effect on the Queensland vocational education and training sector?
Q2.	How has the proliferation of new and emerging technologies impacted the way you've had to manage the business/organisation?
Q3.	What kinds of demand have there been for more technology enabled learning environments within your training organisation?
Q4.	What types of challenges are facing current VET teachers and trainers when it comes to the use of technology to deliver learning?
Q5.	How are the needs of digital literacy of your teachers and trainers being addressed?
Q6.	How do you think professional development opportunities can support the digital literacy development of teachers and trainers?
Q7.	If you had all the budget and resources that you required, what do you think needs to be done to improve the digital literacy skills of VET practitioners?

3.4.1 Validity of interviews

The interview questions were evaluated by the same pilot group that tested the survey questions. The only modifications made were in response to feedback that the initial questions were too narrow and needed to be more open-ended. The main difference between the survey and interviews was that the participants in the interviews all had a previous working relationship with the researcher. These relationships ranged in intimacy from mere acquaintances, to colleagues who had worked together for several years. The issue of response bias, whereby participants tended to present a "favourable image of themselves" (Johnson & Fendrich, 2005, p. 1661) was a concern in the interviews because of these prior relationships. There is also research that suggests that the more sensitive the questions, the more likely for response bias to occur (King & Bruner, 2000). Although the questions asked were not of a personal nature, they could have led to the sharing of sensitive organisational information such as spending and allocation of resources and infrastructure. In order to counter these concerns, I explicitly explained the purpose of the research, how the interviews would be conducted and how the interviewees' identities would be guarded. This, in turn, ensured that the interviewees understood the situation was not like previous workplace interactions, but rather one of a research nature, and that none of the information they provided would be used to gain a professional advantage.

3.4.2 Interview participants, sampling, recruitment and procedure

The participants for the interviews were chosen based on four main criteria that were identified as being able to provide data that could help provide insight and knowledge to the proposed research questions. The criteria were:

(1) Position within RTO – the interviews were designed to provide an overarching and strategic perspective to the issue of digital competency of VET educators, therefore those with positions of influence within the organisation were preferable;
(2) Type of RTO – this allowed for comparisons between public and private RTOs and how they approach these types of issues within their organisations;
(3) Length of time within the VET sector – this demonstrated how viewpoints varied between those who had been in the VET sector for a long period of time versus those who were relatively 'new' to the sector; and
(4) Accessibility – the interviewees needed to be available for interviews during the time allocated.

I spoke to several colleagues about who would be ideal interview participants, and several connections were made at industry conferences. A total of seven potential participants were tentatively approached through conversation, with confirmation of participation occurring when recruitment and consent emails were sent. The final five interviewees were chosen using the following matrix:

Table 3.3: Interview participant selection criteria

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Chosen?
Participant 1	Managing Director	Small/Medium RTO	20+ years	Available	Yes
Participant 2	Department Manager	Large RTO	10+ years	Unconfirmed availability due to leave	No
Participant 3	Director	Large RTO	25+ years	Available	Yes
Participant 4	CEO	Small/Medium RTO	8 years	Available	Yes
Participant 5	Department Manager	Government Department	25+ years	Unavailable due to professional reasons	No
Participant 6	Educational Manager	Large RTO	20+ years	Available	Yes
Participant 7	Educational Leader	Large RTO	15+ years	Available	Yes

A pre-organised time was made with each participant for a phone call to take place. Participants were asked for their consent again, and reminded that the interview would be recorded. All interviews followed this procedure:

(1) An overview of the research project was given – a recruitment email sent out to participants covered information including background to the research, benefits to the VET sector and information about the researcher;
(2) The participants were made aware that the interview would be recorded on an audio device and that their responses would be transcribed and analysed;
(3) All seven questions were asked;
(4) Opportunities for unstructured discussions were taken up; and
(5) The interview was concluded with a statement allowing participants to make any final comments.

3.4.3 Analytical approach to interviews

Although several methods and approaches to analysing and interpreting qualitative data were considered, including phenomenology and narrative analysis, thematic analysis was chosen due to its relatively straightforward approach and flexibility. Boyatzis (1998) describes thematic analysis as a categorising strategy for qualitative data. It is the most ideal approach to studies that seek to discover using 'interpretations' (Alhojailan, 2012), as it allows the researcher to associate the frequency of a theme throughout the entire data collected. In addition, thematic analysis is not just about counting words and phrases – rather, it focuses on "identifying and describing both implicit and explicit ideas" (Namey, Guest, Thairu & Johnson, 2008, p. 138). Thematic analysis also affords the research great flexibility, as multiple theories can be applied across several epistemologies (Braun & Clarke, 2006). It is a process that allows themes to emerge from the data that are important to the description of the phenomenon (Daly, Kellehear & Gliksman, 1997).

Thematic analysis provides a strategy that organises and interprets qualitative data in order to create a 'narrative understanding', which helps to bring together similarities and differences in participants' descriptions of their experiences (Crowe, Inder & Porter, 2015). This is achieved through organising the collected data into three themes, represented as a web-like map:

1. Basic themes – lowest-order premises evident in text;
2. Organising themes – categories of basic themes grouped together to summarise more abstract principles; and
3. Global themes – super-ordinate themes encapsulating the principal metaphors in text as a whole (Attride-Stirling, 2001, p. 388).

Unfortunately, although thematic analysis is widely used in qualitative research, there is no clear agreement on *what* it is or *how* to go about conducting it (Tuckett, 2005; Attride-Stirling, 2001). This ambiguity has also led to its being labelled as something else, for example, discourse analysis or content analysis (Meehan, Vermeer & Windsor, 2000). The benefits that thematic analysis offers include its ability to "unearth themes that are salient in text at different levels" (Attride-Stirling, 2001. p. 387). A possible limitation of thematic analysis conducted by one researcher is that the data will be interpreted from only one perspective. However, in this instance, due to my expertise and understanding of the VET sector, the thematic analysis process turns this perspective into a valuable one. Despite the drawbacks of thematic analysis, the ambiguity of the approach has been mitigated by following the six-step process set out by Attride-Stirling (2001, p. 391):

Table 3.4: Steps in thematic analysis

Analysis Stage A: Reduction or breakdown of text
Step 1 Code material (a) Devise a coding framework (b) Dissect text into segments using the coding framework
Step 2 Identify themes (a) Abstract themes from coded text segments (b) Refine themes
Step 3 Construct thematic networks (a) Arrange themes (b) Select basic themes (c) Rearrange into organising themes (d) Deduce global theme(s) (e) Illustrate as thematic network(s) (f) Verify and refine the network(s)
Analysis Stage B: Exploration of text
Step 4 Describe and explore thematic networks (a) Describe the network(s) (b) Explore the network(s)
Step 5 Summarise thematic networks
Analysis Stage C: Integration of exploration
Step 6 Interpret patterns

(Attride-Stirling, 2001, p. 391)

This analytical approach lends itself to this research project, as the interviews generated a large volume of unorganised data. By filtering the raw data across the six steps outlined above, a summary was produced to pull together a narrative that related back to the original research questions.

3.5 Ethical considerations

As this research involved human participants, as per the Queensland University of Technology (QUT) guidelines concerning research involving the interviewing and surveying of participants, a low risk ethical approval form was completed and submitted.

The application outlined the requirements and expectations of the researcher and participants who voluntarily participated. All comments and responses were treated confidentially. The names of individual persons were not required and kept anonymous in all the responses except for those who opted to participate in the random prize draw. The anonymity of respondents will be securely maintained, with the participant identifiable data (for prize draw purposes) separated from the actual research data.

The submission of the completed survey was accepted as an indication of consent to participate in this project.

The approval was obtained from the QUT Human Research Ethics Committee in accordance with Policy document 6.2.1. The QUT Ethics Approval number is 1200000535.

Chapter 4: Results

As the first point of triangulation, the survey results here help to provide some breadth and understanding into the digital competency of Vocational Education and Training (VET) educators in Queensland. The results of the survey directly address the research questions posed, as well as identifying which participant groups are ready to actively participate and engage in Professional Development (PD) that meets their requirements. This chapter outlines the results from the survey made available for a period of six months. During the data analysis of the survey results, several research propositions were tested to directly address the research questions posed.

4.1 Response rates

The response rate for this research could not be calculated because of the use of random probability sampling. Tracking how many people saw or were exposed to the survey, and calculating how many of those subsequently took the survey, was not possible. A total of 206 responses (165 online and 41 paper-based) were received, with a gender split of 60.4% (n=122) female and 39.6% male (n=80), and a non-response (where the user did not answer the question intentionally or not) rate of 1.9% (n=4). The survey was available online as well as in a paper-based format to ensure that all staff, no matter what their digital literacy or confidence levels, could respond to it. The paper-based surveys only accounted for 19.9% of the responses received, with men more likely than women to complete the paper-based survey (25% vs 16%). There were no differences by age.

4.2 Demographics

The VET sector is enormously diverse in terms of demographics. Staff roles are not necessarily easily defined or categorised, they are irregular and data collection relating to employee backgrounds is often unpublished. This makes it difficult to compare the demographics from year-to-year consistently across the sector. As highlighted by the Productivity Commission, "workforce information is typically requested as part of ad hoc surveys – there is currently no regular reporting for this segment of the workforce" (APC, 2011, p. 160). This lack of information across the VET sector nationally is a gap in knowledge that could be addressed in future research. The implications for the present research study are that reliable comparisons with existing data sets are not possible. I was based in the Brisbane metropolitan area, and my recruitment efforts were concentrated via my professional networks and peers, ie educational managers. Respondents were classified as 'Regional' if they were not from Brisbane. The location of participants was determined by the organisation they worked for. Therefore, as can be seen with the table below, the majority of responses were received from metropolitan-based participants.

Table 4.1: Regional and metropolitan summary

Area	Percent % (n=206)
Regional	28.2
Metropolitan	52.9
Unknown	18.9
Total	**100.0**

The age range of the respondents seemed fairly indicative of the broader VET sector profile. The median age of those who commenced a Certificate IV Training and Assessment was 42; here the median age of respondents was 48, with most (63.37%) participants aged over 45. While six respondents did not answer the age question, it was clear that the workforce is a mature one, with minimal evidence of younger individuals joining the VET sector – only 12.7% (n=26) of respondents were aged 20-35.

Table 4.2: Age of respondents

Age group	Female % (n=122)	Male % (n=80)	Total % (n=202)
20-25	0.82	1.25	0.99
26-35	13.93	8.75	11.88
36-45	22.13	22.50	22.28
46-55	48.36	45.00	47.03
56-65	13.11	21.25	16.34
70+	0.82	0.00	0.59
No response	0.82	1.25	0.99
Total	**100**	**100**	**100**

The data below was collected on behalf of TAFE Queensland using the annual Employee Engagement Survey. Permission to publish the following data was obtained with the understanding that specific Regions would not be identified.

Table 4.3: TAFE Queensland comparative age distribution 2015

	15-20 years	21-25 years	26-30 years	31-35 years	36-40 years	41-45 years	46-50 years	51-55 years	56-60 years	61-65 years	65+ years	Total
Region 1	3 0.40%	19 2.40%	74 9.20%	77 9.50%	86 10.60%	133 16.50%	126 15.60%	144 17.80%	101 12.50%	32 4.00%	13 1.60%	808 100.00%
Region 2	0 0.00%	0 0.00%	12 12.20%	14 14.30%	19 19.40%	15 15.30%	14 14.30%	17 17.30%	7 7.10%	0 0.00%	0 0.00%	98 100.00%
Region 3	1 0.30%	1 0.30%	14 4.30%	27 8.40%	47 14.60%	46 14.30%	49 15.20%	67 20.80%	51 15.80%	17 5.30%	2 0.60%	322 100.00%
Region 4	0 0.00%	8 2.20%	14 3.80%	36 9.90%	49 13.50%	65 17.90%	57 15.70%	57 15.70%	50 13.70%	21 5.80%	7 1.90%	364 100.00%
Region 5	1 0.30%	8 2.00%	31 7.80%	35 8.80%	36 9.10%	75 18.90%	61 15.40%	69 17.40%	52 13.10%	18 4.50%	11 2.80%	397 100.00%
Region 6	2 0.50%	20 4.60%	23 5.30%	38 8.70%	43 9.90%	52 11.90%	64 14.70%	92 21.10%	66 15.10%	30 6.90%	6 1.40%	436 100.00%
Region 7	1 0.30%	8 2.20%	12 3.30%	16 4.40%	36 9.90%	84 23.10%	64 17.60%	74 20.40%	44 12.10%	20 5.50%	4 1.10%	363 100.00%
Overall	8 0.30%	64 2.30%	180 6.50%	243 8.70%	316 11.30%	470 16.90%	435 15.60%	520 18.70%	371 13.30%	138 4.90%	43 1.50%	2788 100.00%

Source: People Knowledge Consulting

Mode
Median

It has been noted that over time, "the attractiveness of an academic career has diminished through factors such as a lack of job security caused by increased casualisation, increasing workloads and lower salaries compared with other sectors" (APC, 2011, p. 23). These factors may also contribute to the age profile of the Queensland VET sector. In this research, 62.13% (n=128) of the respondents were aged 46-65. In the 2012 Queensland Public Service Workforce Characteristics: 2011-2012 Report, the mean age of employees retiring was reported as 55 years, which suggests that a large proportion of the Queensland TAFE workforce will be retiring in less than 10 years. This means that if effective legacy strategies are not adopted, the sector will suffer immensely when these skilled and experienced workers depart.

4.2.1 Organisational roles

The survey respondents were largely VET teachers and trainers, with about one in ten reporting that they were managers.

Table 4.4: Role within organisation summary

Role	Percent (n=206)
Teacher/Trainer	76.20
Administrator	4.90
Content developer	2.40
Manager	11.70
Subject matter expert	2.40
Other	2.40
Total	**100.00**

As is the case with age and gender profiles, there is inconsistent and incomplete data on the roles and occupations of those employed by VET in Queensland. The APC stated in their 2011 report that "robust estimates of the overall VET workforce (which includes trainers and assessors, other VET professionals and general staff – are not available)" (p.34). Reliable data on the national TAFE workforce (from administrative collections) estimates there are 73,000 TAFE employees nationwide, but they offer no Queensland breakdown (APC, 2011, p. 34). A further layer of difficulty is the fact that there is no consistent definition in the TAFE administrative systems of key workforce concepts such as 'employee', 'teacher' and 'permanent'. This issue is compounded by the fact that there is no profile of the private Registered Training Organisation (RTO) workforce in Queensland that provides data on workforce makeup and capability.

4.2.2 Length of time in the VET sector

Table 4.5: Length of time in the VET sector between male and female respondents

Duration	Female % (n=122)	Male % (n=84)	Total % (n=206)
1 year or less	3.28	3.57	3.40
2-5 years	27.05	27.38	27.18
6-10 years	20.49	30.95	24.76
10-15 years	18.85	13.10	16.50
15+ years	30.33	20.24	28.16
Total	**100.00**	**100.00**	**100.00**

Nearly one in three respondents (28.16%) had worked in the VET sector for 15 or more years, with 70% having been employed in VET for more than 5 years. Female respondents tended to stay within the VET sector longer than men (30.33% had been there for 15+ years, versus 20.24%). By way of contextualisation, the Australian Bureau of Statistics (ABS) reported in 2013 that more than 50% of Australia's 11.5 million workers had been in their jobs for less than five years, with 18% in their jobs for less than one year. VET educators' tendency to stay

within the same RTO for a long period of time highlights a need to ensure their knowledge and industry currency is maintained as required by the sector.

4.2.3 Teaching area

Respondents self-identified their own faculty/teaching areas. These areas were coded and categorised afterwards. About 29% were classified into 'Community,' 'Health' and 'Education,' with 23% in 'Trades,' another 23% in 'Business,' 'IT,' 'Science' and 'Creative Industries,' and the final 25% categorised as 'General,' encompassing areas that do not clearly fit into a particular discipline or faculty due to their administrative or business nature. Four respondents did not answer this question. Refer to Appendix E Table 4.6: Discipline areas – grouped for a full breakdown of the faculty/teaching areas page 136.

4.2.4 Educational background

In the table below it is clear that female respondents tended to hold higher qualifications than their male counterparts. Sixty percent of female respondents had Bachelors or postgraduate level qualifications, compared with only 45% of male respondents. The following table shows the highest level of completed education of the respondents.

Data about the qualifications held by the workers in the Queensland VET sector is not readily available. Although I am aware from experience that this data is collected as part of industry currency and audit purposes, it is not often published or made public. Within the VET sector, the basic requirement to teach is a Certificate IV Training and Assessment. Industry currency, knowledge and skills are given a higher priority than teaching expertise, and it is expected that teachers will initially gain what they need to teach 'on-the-job' (Harris et al., 2001). The survey fieldwork took place during a time of changes and announcements about TAFE reform. Due to the nature of the question being personal and related to qualifications that people held (in a sector where industry experience and qualifications are pertinent), some apparently did not feel comfortable answering the question (n=16).

Table 4.7: Male and female qualification summary – highest level education completed

	Female % (n=122)	**Male % (n=80)**	**Total % (n=202)**
School	1.64	5.00	2.97
Certificate	36.89	40.00	38.12
Bachelors	30.33	36.25	32.67
Postgraduate	25.41	7.50	18.32
No Response	5.73	11.25	7.77
Total	**100.00**	**100.00**	**100.00**

4.3 Device ownership

During the period in which the survey was active, the issue of device ownership was relatively new within the VET sector, especially regarding devices such as tablets and smartphones that blur the lines of personal and professional usage. Debated issues include: the value of providing devices to teachers, app and device management, and the return on investment for the organisation, which were highlighted in the 2010 and 2011 iPad trials conducted by the Department of Education (2010-2011). This is definitely an area that requires additional research, as organisations are now faced with managing different devices, platforms and operating systems in a cohesive and cost effective manner, as there is no single off-the-shelf solution available. It seems that ownership of laptops (either work-provided, personally owned, or both) was very common, with no difference between males and females. Smartphone ownership was also very common, at about eight in ten (with more males owning smartphones than females). The results here are almost on par with the general population; smartphone penetration is now estimated at 84% from just 19% in 2007, according to the Australian Mobile Phone Lifestyle Index (Business Insider Australia, 2013).

It is clear from the table below that ownership of laptops is quite common across all disciplines, which is to be expected, as Nielson reported in 2013 that laptop ownership in Australia had increased from 33% to 77% over 10 years. Surprisingly, the business area ranked lowest when it came to tablet ownership, well below the current national average of 50% (ACMA, 2014). Smartphone ownership across all disciplines was on par with the national average of 81% as reported by Nielson in 2014.

Table 4.8: Summary of device ownership by disciplines

Device: Laptop					
	Trades (n=47)	Community (n=57)	General/Admin (n=54)	Business (n=48)	Total (n=206)
Yes	91.49	94.74	96.30	97.92	95.15
No	8.51	5.26	3.70	2.08	4.85
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Device: Tablet					
Yes	46.81	54.39	63.00	23.00	39.81
No	53.19	45.61	37.00	77.00	60.19
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Device: Smartphone					
Yes	80.85	72.00	83.33	81.25	79.13
No	19.15	28.00	16.66	18.75	20.87
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Again, the results below reinforce the above, that is, that laptop and smartphone ownership is almost universal across all age groups, with tablet ownership still developing. There were no surprises that almost all of those aged under 35 had smartphone ownership (96.15%), and that those in the 56+ age group had the lowest smartphone penetration. It should be noted that the assignment of a laptop to an employee often depends on whether their job role requires them to be 'mobile'. For example, there would be no requirement for an administrative officer to move from class to class, therefore they would be assigned a desktop computer instead, which could explain why

those aged under 35 had lower laptop ownership.

Table 4.9: Summary of device ownership by age group

Device: Laptop				
	Under 35 (n=26)	36-55 (n=142)	56+ (n=36)	Total (n=204)
Yes	88.46	96.48	94.44	95.10
No	11.54	3.52	5.56	4.90
Total	**100.00**	**100.00**	**100.00**	**100.00**
Device: Tablet				
Yes	61.54	61.97	52.78	39.71
No	38.46	38.03	47.22	60.29
Total	**100.00**	**100.00**	**100.00**	**100.00**
Device: Smartphone				
Yes	96.15	78.87	66.67	78.92
No	3.85	21.13	33.33	21.08
Total	**100.00**	**100.00**	**100.00**	**100.00**

4.4 Digital confidence of VET educators

Survey participants were required to answer a series of questions that asked them about their ability complete certain tasks on three devices: (1) laptop; (2) tablet; and (3) smartphone. The tasks were further grouped into basic and intermediate levels.

Table 4.10: Category of basic and intermediate skills

Task	Basic	Intermediate
Manage your calendar?	x	
Download music? Ie iTunes/GooglePlay	x	
Download an App? Ie iTunes/GooglePlay	x	
Send a text message with multimedia? Ie image/video/audio	x	
Make or receive a video call? Ie Skype/FaceTime	x	
Upload an image to social media? Ie Facebook/Twitter	x	
Tag yourself and others on social media? Ie Facebook	x	
Check-in to a location on social media? Ie Facebook	x	
Tethering or hotspotting?	x	
Pay a bill online?	x	
Create tables, customize cells, insert and delete rows/columns?		x
Shop online?		x
Install a software program? Ie Microsoft Office		x
Play multimedia file? (wav, mp3, avi) etc		x
Create diagrams? Ie organisational charts		x
Edit a PDF form?		x
Contribute to a website? Comments, blogs, chatrooms?		x
Include animations in PowerPoints		x
Update the operating system on computer		x
Enter simple formulas and functions in Excel cells? Ie 1A+2B = 3C		x
Facilitate a web conference? Ie Skype		x
Create your own blog, wiki or virtual community?		x
Develop a website?		x
Create an eBook?		x

Table 4.11: Basic tasks by device

Task	Laptop 'Yes'%	Tablet 'Yes'%	Smartphone 'Yes'%
Manage your calendar?	78.20	54.40	64.10
Download music? Ie iTunes/GooglePlay	65.50	41.70	48.10
Download an App? Ie iTunes/GooglePlay	63.60	54.90	64.60
Send a text message with multimedia? Ie image/video/audio	63.10	47.10	76.70
Make or receive a video call? Skype/FaceTime	58.30	37.40	49.00
Upload an image to social media? Ie Facebook/Twitter	56.80	38.30	47.10
Tag yourself and others on social media? Ie Facebook	50.00	34.50	39.80
Check-in to a location on social media? Ie Facebook	45.10	31.10	43.20
Tethering or hotspotting?	32.50	28.20	35.00

Respondents were less competent with a tablet device than with a laptop, with several never having completed basic tasks such as sending a multimedia message, downloading apps and music, receiving video calls and engaging with social media. That basic features such as the ability to tether their device had not been accessed is concerning given that being unable to connect tablet devices to the internet severely impacts their core function. As can be seen in the table below, where respondents were asked whether they had ever completed any of the tasks, tasks such as paying bills have helped propel the use of new technologies. For example, BPAY (2015) was introduced in 1997 as a way for customers to pay bills over the telephone. It evolved to online payments surpassing phone payments by 2003, with mobile BPAY available in 2010. As of 2012, 92% of all BPAY was completed online. This progression has meant that the skills required to complete payments online have been and can be applied elsewhere, for instance, in the workplace.

Table 4.12: Intermediate tasks and workplace comparison

Task	Workplace comparison
Pay a bill online?	Filling out and submitting forms online
Create tables, customize cells, insert and delete rows/columns?	Tracking student progression
Shop online?	Completing online transaction ie online payment of student enrolment
Install a software program? Ie Microsoft Office	Installing programs related to their needs ie CAD
Play multimedia file? (wav, mp3, avi) etc	Finding multimedia content relevant to their teaching area
Create diagrams? Ie organisational charts	Creating diagrams to explain concepts
Edit a PDF form?	Creating and editing interactive PDF forms and workbooks
Contribute to a website? Comments, blogs, chatrooms?	Facilitating online discussions with students
Include animations in PowerPoints	Creating engaging PowerPoints
Update the operating system on computer	Updating Java or Microsoft Silverlight
Enter simple formulas and functions in excel cells? Ie 1A+2B = 3C	Calculating final grades
Facilitate a web conference? Ie Skype	Assessing and engaging students via web conference
Create your own blog, wiki or virtual community?	Creating a community with students
Develop a website?	Developing engaging learner content
Create an eBook?	Developing engaging learner content

In the table below, it can be seen that affirmative responses started decreasing when respondents were asked about their ability to engage in online social activities such as facilitating a web conference or participating in a blog or virtual community. The skills required to successfully manage these interactions can easily be applied in a workplace context where a teacher may be asked to facilitate an online course, therefore any PD delivered for the purposes of upskilling teachers for online delivery should focus on increasing this skill. In addition to participating in the actual development of such communities, the development of a website and eBook was on the lower end, with only 27.7% having developed a website and 14.6% having created an eBook.

Table 4.13: Intermediate tasks

Task	% Yes
Pay a bill online?	91.70
Create tables, customize cells, insert and delete rows/columns?	91.70
Shop online?	83.00
Install a software program? Ie Microsoft Office	83.00
Play multimedia file? (wav, mp3, avi) etc	82.00
Create diagrams? Ie organisational charts	79.10
Edit a PDF form?	76.20
Contribute to a website? Comments, blogs, chatrooms?	75.20
Include animations in Powerpoints	73.80
Update the operating system on computer	73.30
Enter simple formulas and functions in excel cells? Ie 1A+2B = 3C	72.80
Facilitate a web conference? Ie Skype	52.40
Create your own blog, wiki or virtual community?	40.80
Develop a website?	27.70
Create an eBook?	14.60

The three activities above with the lowest completion rates will be used for further hypothesis testing below, starting with the differences between age, discipline area and qualifications.

Table 4.14: Age groups compared with ability to complete basic tasks on laptops, tablets and smartphones

Age	Laptop Basic		Tablet Basic		Smartphone Basic		Interm. tasks	
	Means	SD	Means	SD	Means	SD	Means	SD
Under 35 (n=26)	6.23	1.98	4.46	3.03	6.50	2.24	11.23	2.99
36-45 (n=45)	5.58	2.75	4.93	3.54	5.80	3.12	11.44	2.74
46-55 (n=97)	5.02	2.76	3.45	3.03	4.38	3.08	9.74	3.84
56+ (n=36)	3.92	2.80	2.14	2.46	2.78	2.71	8.89	3.39

The Kruskal-Wallis non-parametric test for basic and intermediate laptop (χ^2 (3) = 0.009, p <0.05), tablet (χ^2 (3) = 0.002, p <0.05) and smartphones (χ^2 (3) = 0.000, p <0.05) were all statistically significant. Younger respondents were more likely to be capable of completing the intermediate tasks compared to their older counterparts.

Table 4.15: Discipline groups compared with ability to complete basic tasks on laptops, tablets and smartphones

Discipline	Laptop Basic		Tablet Basic		Smartphone Basic		Intermed. Tasks	
	Means	SD	Means	SD	Means	SD	Means	SD
Trades (n=47)	5.17	3.10	3.30	3.27	4.83	3.07	10.02	3.37
Community (n=57)	4.56	2.65	2.68	2.68	3.70	3.00	9.37	3.48
General Administration (n=54)	5.48	2.38	4.00	3.10	5.31	3.00	10.24	3.30
Business (n=48)	5.35	2.84	4.85	3.35	4.96	3.35	11.19	3.84

Here, there is no statistical significance (χ^2 (3) = 0.299, p <0.05) between the discipline areas with regards to their ability to complete tasks using a laptop. Interestingly, those in the Trades were more digitally competent than those within the Community area when it came to the use of tablets (χ^2 (3) = 0.005, p <0.05) and smartphones (χ^2 (3) = 0.044, p <0.05) as well as intermediate tasks (χ^2 (3) = 0.014, p <0.05).

Table 4.16: Qualification levels compared with ability to complete basic tasks on laptops, tablets and smartphones

Qualification level	Laptop Basic		Tablet Basic		Smartphone Basic		Intermed. Tasks	
	Means	SD	Means	SD	Means	SD	Means	SD
Certificate (n=24)	6.17	2.03	4.79	2.91	6.46	5.38	11.25	3.06
Bachelor (n=45)	5.58	2.75	4.93	3.54	5.80	3.12	10.62	2.74
Postgraduate (n=97)	5.02	2.76	3.45	3.03	4.38	3.08	11.25	3.06

There was no statistical difference between qualification levels when it came to completing tasks using a laptop (χ^2 (2) = 0.178, p <0.05). However, the differences become clearer with the use of tablets (χ^2 (2) = 0.036, p <0.05) and smartphones (χ^2 (2) = 0.002, p <0.05), and with intermediate tasks (χ^2 (2) = 0.025, p <0.05). Those with postgraduate qualifications were weaker in the use of tablets and smartphones compared to those who held a Certificate or Bachelors. A possible explanation for this is that senior managers are given tablets to help organise their schedules and provide mobility away from their desks, however, in reality, many of these tablets become devices used by their administration officers instead. Therefore, while they may technically 'own' the device they may not be the device 'user'.

4.5 Digital confidence of VET teachers - scenarios

Respondents were asked a series of 15 scenario-based Likert questions (14 of which were mapped to TPCK) that addressed their digital competency levels. The results will contribute to creating an understanding of which groups within the Queensland VET sector require PD interventions to develop their digital competency skills. For reporting purposes, the 14 questions were grouped into the four main TPCK categories of Technological Knowledge (TK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK) and Technological Pedagogical Content Knowledge (TPCK) (refer to Table 3.1, page 42 for the detailed category of questions into TPCK).

Table 4.17: TPCK categorisation of scenario-based Likert questions

TPCK	Question
TK	12. Your organisation is rolling out iPads and providing a 3hr demonstration. How confident are you that you can learn to use the iPad in 3hrs? 3.84 19. Not all students have equal access to technology. How confident are you in identifying one or more students who might have access issues? 3.71 20. How confident are you that you can model and teach safe usage of technology to your students, including internet safety? 3.58
TPK	13. How confident are you that you can effectively judge when and how to use technology to support your students' learning? 3.57 14. A vendor suggests a program that records lectures with audio. How confident are you that you can evaluate its suitability to your teaching? 3.57 15. Your manager asks you to demonstrate a software program to your teaching peers. How confident are you that you can accomplish this task? 3.50 16. How confident are you advising managers about purchasing educational technologies by evaluating their suitability to your teaching needs? 3.31 21. How confident are you in using a learning management system at your organisation ie Moodle, Blackboard to deliver teaching and training? 3.29 22. How confident do you feel with supplementing your teaching and training with technology ie eAssessment, wikis, videos, images, smartphones? 3.25 23. How confident do you feel about creating an eBook to supplement how you deliver teaching and training? 2.69 32. How confident would you be facilitating a course completely online with minimal face-to-face contact with your learners? 3.03 37. How confident are you in providing support to students who ask for more flexibility in their learning? ie eAssessment, forums 2.68
TCK	18. Your students are using the internet to research a topic. How confident are you in providing them with a list of high quality websites? 3.94
TPCK	17. Trends stress high order skills like analysis, synthesis and evaluation. How confident are you in using technology to improve these in students? 3.13

4.5.1 TK, TPK, TPCK and TCK

When combining the TK scenario-based questions, a result of mean = 3.66 and SD = 0.95 was found. On a scale of 1 to 5, this clearly indicates that the confidence levels of those surveyed were slightly above average on the 1 to 5 scale in their ability and knowledge of technologies for educational purposes. A Kruskal-Wallis non-parametric test for the qualification levels and the TK questions was statistically significant (χ^2 (2) = 0.01, p <0.05), with those who held Postgraduate qualifications more confident in this area than those who held a Certificate or Bachelors.

Using the Mann-Whitney U non-parametric test to compare the confidence levels of men and women in their TK abilities showed that men were more confident than women ($U = 0.005$, $p < 0.05$). When comparing the different age groups and their TK capabilities, it was interesting to see that those aged 46 and above were more confident than their younger counterparts (χ^2 (3) = 0.00, $p < 0.05$). There were no statistical difference between discipline areas when comparing their TK capabilities, with a result of (χ^2 (3) = 0.82, $p < 0.05$). Here, the results indicate that teachers are generally confident in their ability to master and demonstrate low-tech technologies such as the internet, digital video and software programs to their peers and managers. This could possibly be due to the common practice of 'lunchbox' sessions, where teachers drop into a session to learn about a tool or technology they are able to use.

The mean for TPK scenario-based questions was 3.18, with SD = 1.02, significantly lower than TK. Here, there was no statistical significance between TPK and qualification levels (χ^2 (2) = 0.08, $p < 0.05$) or discipline areas (χ^2 (3) = 0.62, $p < 0.05$). However, when comparing TPK and age groups using the Kruskal-Wallis non-parametric test, like TK, those aged 46+ were more confident than those aged under 46. As with TK, men were more confident than women with TPK capabilities ($U = 0.02$, $p < 0.05$). The results here indicate that older male VET teachers are generally quite confident with their knowledge of how various technologies can be used in teaching and learning. A possible explanation for this could be that because those who are generally older have been in VET for many years (15+), their knowledge of how to integrate technologies into their delivery could outweigh that of their younger counterparts.

The TPCK based scenario question required teachers to have knowledge in integrating technology into their teaching in their specific area of expertise. As the complex element of TPCK, which combines the components of CK, PK and TK, the results here were surprising when comparing age groups. Using the Kruskal-Wallis non-parametric test, those aged under 46 were far less confident than those aged 46 and above, with those in the 56+ age group the most confident in this capability. Using the Mann Whitney U non-parametric test to compare the confidence levels of men and women, this was the only capability where women felt more confident than men ($U = 0.01$, $p < 0.05$). Therefore, it is clear that older female VET teachers are the most confident group when they are called upon to manage the overlaps between CK, PK and TK. However, more research would be required to determine what kind of activities are undertaken by VET teachers using their TPCK capabilities.

The TCK scenario-based question showed mean = 3.94 and SD = 1.04, which was the highest of all capabilities. Here, there was no statistical significance between men and women ($U = 0.68$, $p < 0.05$), qualification levels (χ^2 (2) = 0.40, $p < 0.05$) or disciplines (χ^2 (3) = 0.51, $p < 0.05$). However, there was a significant difference when comparing the age groups with those aged over 45 more confident in their TCK capabilities than those aged under 35 (χ^2 (3) = 0.02, $p < 0.05$). Similar to TPCK, those aged 56+ were the most confident age group with this capability. The results here indicate that teachers understand that using certain technologies allows them to change the way learners practice and understand concepts in a specific content area. A possible explanation for this strongest performing capability could be that the sample group of those aged under 35 was far smaller than those aged 45 and above. In addition, of those surveyed, many of the younger respondents were not part of the teaching

area, therefore further research is required.

The overall digital competency levels of the Queensland VET workforce surveyed could be described as average. This is not a particularly strong result, however, as a baseline, it provides a helpful starting point for any future research in this area, especially with PD programs for those aged 45 and above.

4.6 Professional development

The survey asked five questions focused on whether the PD participants had attended had any relevance, and what their interest level in attending PD to improve their knowledge and expertise in digital pedagogies was. Here, regarding the overall relevance rating of PD previously attended, the mean = 3.26 and SD = 0.959. On a scale of 1 to 5, the results are again average, and similar to the TK, TCK and PCK competencies.

Table 4.18: Overall relevance rating of PD attended

Relevance	Female % (n=122)	Male % (n=80)	Total % (n=202)
No relevance at all	4.10	7.50	5.45
Some relevance	10.65	15.00	12.37
Relevant	50.82	26.25	41.09
Very relevant	28.69	41.25	33.66
Completely relevant	5.74	10.00	7.43
Total	100.00	100.00	100.00

As these questions were not compulsory, when asked about the types of PD they had attended in the past six months, there was a total of 171 responses. Overall, 17% (n=35) of respondents did not participate in any form of PD. This is very discouraging, as PD should be part of a teacher's overall requirement to retain their industry currency. More men did not attend any PD than women, and the majority of PD attended for all respondents included workshops, conferences and industry-related PD. Although the sample size was small, among those who did not attend PD in the last six months, more than half (57.1%) held a postgraduate qualification. The explanation for this would be hard to quantify without further investigation. Of those who answered the open-response question, 45.03% identified digital pedagogies and ICT as the most in-demand future PD.

Of all the discipline areas, the Trades desired digital pedagogy and ICT PD the least, with Business taking the lead at 75.00%, followed by General Administration at 64.16% and Community at 59.65%. The Trades area did have the strongest desire for PD in general, with 25.53%, but they also had the highest no response rate (12.76%) to this question. The Business area had the lowest, at 4.17%.

Table 4.19: Desired future PD and discipline area

Desired future PD	**Discipline**			
	Trades (n=27)	Community (n=57)	General/Admin (n=53)	Business (n=48)
Digital pedagogy and ICT	48.94	59.65	64.16	75.00
More PD	25.53	17.55	7.54	4.17
No response	12.76	12.28	11.32	6.25
Uncertain	6.38	0.00	1.90	0.00
Workshops, Conferences, Seminars, Online	4.26	5.26	7.54	8.33
Leadership, Compliance, Management, Finance	2.13	5.26	7.54	6.25
Total	**100.00**	**100.00**	**100.00**	**100.00**

The Kruskal-Wallis non-parametric tests showed that there were no statistical significances when comparing the desired future PD with qualification levels (χ^2 (2) = 0.360, p <0.05).

Table 4.20: Desired future PD and qualification level

Desired future PD	Qualification level		
	Certificate (n=24)	Bachelor (n=45)	Post graduate (n=96)
Digital pedagogy and ICT	66.67	66.66	62.50
No response	16.67	8.89	10.41
Leadership, Compliance, Management, Finance	8.33	6.67	3.13
More PD	8.33	6.67	19.79
Uncertain	0.00	2.22	1.04
Workshops, Conferences, Seminars, Online	0.00	8.89	3.13
Total	100.00	100.00	100.00

The survey results have provided a quantitative grounding for the research project. This is complemented with the qualitative results from the interviews with VET educational managers, which will be discussed in the next section.

4.7 Interview results

The interview results were produced using thematic analysis, and provided the second point of triangulation in this research. Thematic analysis provides a strategy that organises and interprets qualitative data in order to create a 'narrative understanding', which helps to bring together similarities and differences in participants' descriptions of their experiences (Crowe, Inder & Porter, 2015). This is achieved through organising the collected data into three themes, represented as a web-like map:

1. Basic themes – lowest-order premises evident in text;
2. Organising themes – categories of basic themes grouped together to summarise more abstract principles; and
3. Global themes – super-ordinate themes encapsulating the principal metaphors in text as a whole (Attride-Stirling, 2001, p. 388).

4.8.1 Interview participants

Fortunately, no participant flagged any concerns about their ability to respond after perusing the questions. Those chosen for interview were:

1. **DR and RC** – from a large public Registered Training Organisation (RTO) in the Brisbane metropolitan area, and with more than 15 years in the VET sector each. Working as educational managers and leaders in this organisation, DR and RC had a unique perspective, as their roles were directly related to building the capacity of their teachers across one of the largest RTOs in Queensland. DR and RC were grouped together, as they were from the same RTO. The RTO delivers qualifications across more than 28 disciplines, which makes their experiences extremely relevant and valuable to this research. Their responsibilities include developing PD plans and strategies that cater to hundreds of VET teachers. Another reason DR and RC were interviewed together was that they had a large area of responsibility, and so it was important to understand their cohesive approach to targeting specific PD programs within their RTO.

2. **GB** – from a large public RTO in the north of Brisbane, and with more than 25 years in the industry. It is part of GB's responsibilities to ensure their VET teaching workforce is currently inline with industry requirements. This RTO also has a large portfolio, delivering qualifications in more than 15 disciplines (at the time of the interview). GB has had a history of developing and implementing RTO-wide PD programs to increase the digital competency of VET teachers.

3. **BC** – from a medium private RTO in Brisbane that delivers training to domestic and international clients, and with seven years' VET experience. This RTO is known for winning several awards in e-learning development and delivery, as well as delivering qualifications in around 10 disciplines. This perspective was valuable in understanding how a private RTO may address the same issues faced by public RTOs.

4. **MW** – from a small-medium private RTO in Brisbane with interstate offices in the retail training management sector, and with eight years' VET experience. Focusing on the delivery of qualifications in three main areas, this smaller RTO is known for its flexible delivery options of fully online, self-paced and blended approaches. MW also had a history of engagement with government strategies designed to increase the uptake of e-learning within RTOs.

4.8.2 Thematic analysis of interview data

The two main perspectives derived from these interviews are that of the public verses private RTO experience, which were represented. All interviews were recorded and conducted over a period of two weeks. They were then played back repeatedly and transcribed in quick succession. The five steps advised by Sbaraini, Carter, Evans and Blinkhorn (2011) in supporting the development of high quality research findings were followed in this

research project. These included the digital recording of interviews; analysis of transcripts as soon as possible; memo writing; contacting participants for clarification (if required); and employing phone interviews for greater participation. The process set out by Attride-Stirling (2001, p. 391) for thematic analysis was then followed.

Analysis Stage A: A reduction or breakdown of text

Step 1 Code material

(a) **Devise a coding framework** –The recorded interviews were transcribed, printed, and highlighted into segments based on the seven interview questions asked. Transcriptions were read a few times to become familiar with the text. During this process, key words such as 'Professional Development' (PD), 'competency,' 'resources,' 'digital' and 'technology' were also flagged.

(b) **Dissect text using the coding framework** – The data was reviewed repeatedly, this time with a detailed focus on identifying "meaningful and manageable chunks of text such as passages, quotations, single words" (Attride-Stirling, 2001, p. 391). These phrases and words were highlighted and identified using colour coding, as well as underlines and notes on the margins of the printed data. At this stage, the data was still structured based on the order in which the seven questions were asked.

Step 2 Identifying themes

(a) **Abstract themes from coded text segments** – Here, themes began to emerge as a result of the steps above. The re-reading of the highlighted phrases and words aided the discovery of significant themes, commonalities and patterns in the text, which were noted in the margins.

(b) **Refine themes** – At this stage, the identified themes were further refined into "two groups: (i) specific enough to be discrete (non-repetitive), and (ii) broad enough to encapsulate a set of ideas contained in numerous text segments" (Attride-Stirling, p. 392). This was where the data started to move away from the sequence of questions asked, and towards themes that related to various areas such as PD in vocational education and training (VET), and employee attitudes and feelings towards technology.

Step 3 Constructing the networks

(a) **Arrange themes** – As all participants were asked the same questions, their responses were grouped into specific groupings by similarity. For example, positive and negative responses relating to the proliferation of educational technologies in VET. Around 19 themes and six global themes were identified.

(b) **Select basic themes** – From the step above, the basic themes were established.

(c) **Rearrange into organising themes** – The basic themes were then further grouped together to create organising themes.

(d) **Deduce global themes** – This step requires the "main claim, proposition, argument, assertion or

assumption" (Attride-Stirling, 2001, p. 393) from the organising themes be reduced to a principle idea that encapsulates the main idea of the text.

(e) Illustrate as thematic network(s) – Refer to Figure 1.5. page 74.

(f) Verify and refine the network(s) – This step allowed the researcher to look at the thematic network diagram and to reflect on data to ensure the greatest possible accuracy. That is, the data used to form the basic themes, and therefore the organising and global themes are well-supported.

Analysis Stage B: Exploration of text

Step 4 Describe and explore the thematic networks

(a) Describe the network – Stage A was focused on organising the data using thematic analysis as a tool, however, in this stage, the goal is to start analysing the data to find meaning in the text as well as to identify any patterns. Descriptions were noted regarding each network formed.

(b) Explore the network – This was done in conjunction with describing the network, identifying patterns as the descriptions were formed. The difference in this re-reading of the text is that it focuses on the basic, organising and global themes (in the suggested clockwise direction) as opposed to a linear fashion.

Step 5 Summarise the thematic network

A presentation of the main themes and patterns was made, with the objective of summarising the principal themes that emerged from the data.

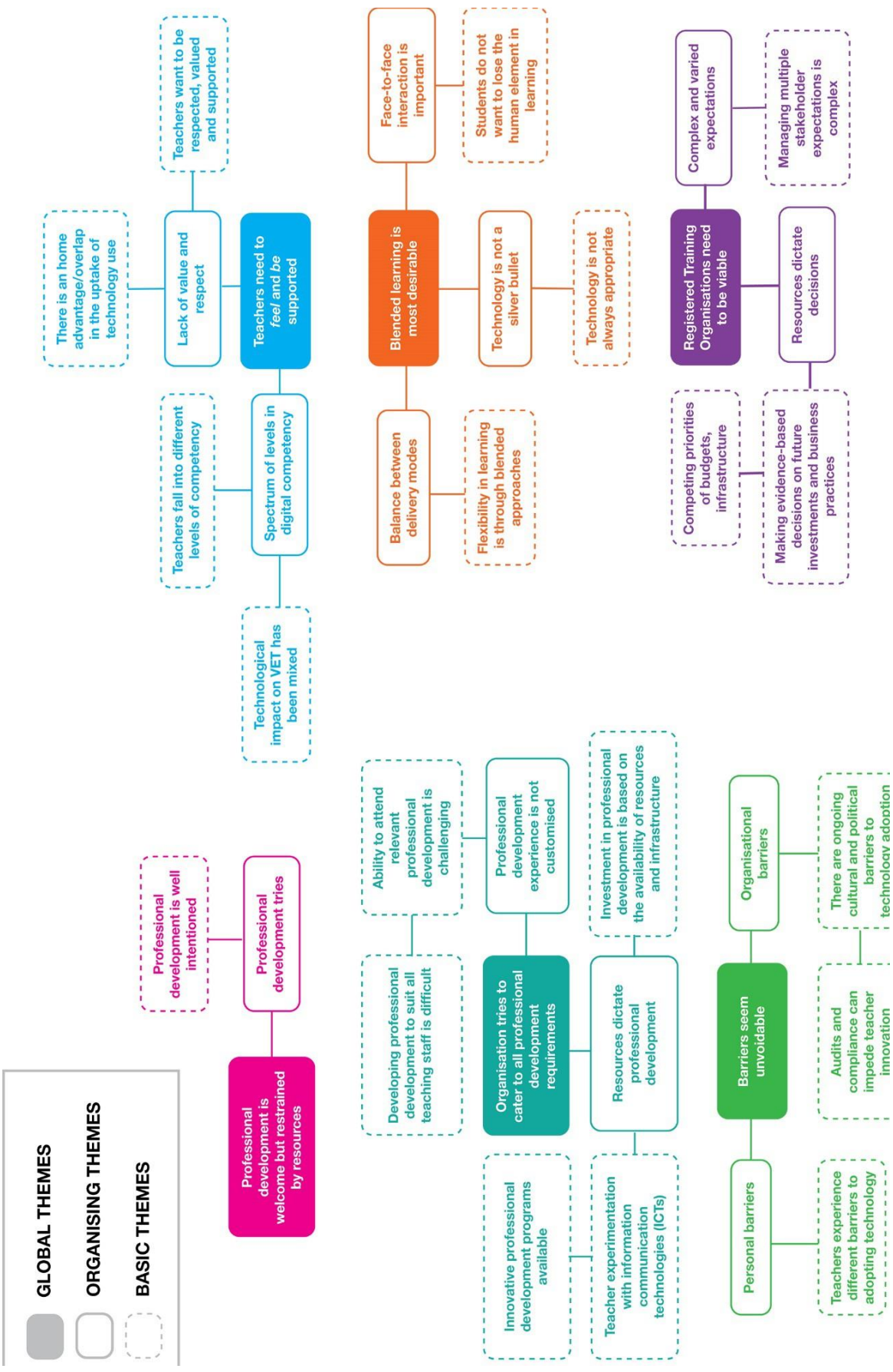
Analysis Stage C: Integration of exploration

Step 6 Interpret patterns

The posed research questions could then be addressed using the identified themes as well as the concepts and patterns that emerged from the text.

Refer to Appendix F: Table 4.21 From codes to themes
Refer to Appendix G: Table 4.22 From basic to organising to global themes

Figure 1.5: Illustration of thematic network based on interview data



4.8.3 Summary of thematic analysis of interviews

RTOs need to be viable

The impact and demands for educational technology have been largely mixed, resulting in changes to business practices for some RTOs. The private providers particularly felt this, with MW describing changes to their business planning:

> What is the best technology now? How are we going to invest in it? How are we going to execute it? I think on the one side, the economic climate and the dynamic environment mobilises you into action, but I think it also reduces time. It kind of enables you to make those decisions without the fear of, 'oh it's going to happen in five years', because you are not worried about five years, you're worried about next year.

Similarly, BC's organisation has also seen a significant change to their business practices, particularly in the information technology (IT) department, through hiring another support person and developing an in-house online content team.

The approach to changing business practices for the public providers such as GB's has been more on their processes:

> It's really difficult to stay up with emerging technology, also to… make evidence-based decisions on which one is going to be applicable [and] to make sure you have quality outcomes for the students when they are undertaking the training, or even our business systems.

BC also found that for their business, 'flexibility' was an important factor that students considered when choosing the institution, which in turn affected their offerings:

> I think that we have a different number of different programs that we deliver, and our target for our audience in each of those program areas is quite different. If you are delivering online management and project management, for instance, you are dealing with those sort of people who are IT savvy and don't mind online learning.

It is quite evident that the impact of Information Communication Technologies (ICTs) has had a varied impact on RTOs as a whole. Many have had to reevaluate the way in which their organisations operate to ensure their survival. The pressure comes from internal and external sources, including organisational sources, teachers, students and competitors. All participants acknowledged that educational technology could not be ignored and needed to be addressed; however, the nature of how these issues were managed was very particular to their organisational needs.

For some, the technological impact had been significant, for others it has been more gradual, while others fell in between. Interestingly, it was the public providers who seemed to have been most affected by learning technologies, with GB rating the impact in their organisation as nine out of 10: "To me, it's impacted on our whole notion of product that we deliver and market, it has really been a major driver." This was somewhat echoed by DB, who suggested the impact was yet to be fully felt, but soon would be, as pressure was definitely mounting: "I think there are pockets where amazing stuff is happening, but I think the future is going to be really pushed towards that, I don't think anyone will escape the pressure, really."

MW likened it to more of a technology adoption cycle, where there will always be early adopters, but there had not been a huge rush towards adoption because of the ever-changing nature of technology. This was reflected in their statement:

> I think probably a lot of people have held back because of the pace of change in technology, and as soon as you think you've got your head around something, something comes up on the horizon and you think well I don't want to be in the old thing, I want to be in the new thing.

BC indicated that, in their experience, it was currently "emergent": "there are a number of providers out there that are very proficient at it at the moment, and there're a number that haven't embraced it at all… you've got the full spectrum there." It seems that there is no general consensus on the impact of educational technologies on RTOs, as experiences varied greatly. However, what was similar was the acknowledgement that it could no longer be ignored. BC stated that "you ignore it at your peril", GB described it as being crucial to "maintain market share" and MW describing it a "vicious cycle," as they didn't know when to jump on the ride. MW further elaborated with the comment that "the risk used to be 'certainly it's very risky to invest in e-learning', I think that's shifted to the risk being not going into e-learning."

Teachers need to feel and be supported

When the participants were asked about the digital competencies and capabilities of their VET teachers, an interesting pattern emerged, suggesting that those who used technology in their personal lives were more capable. This is countered by some literature, which suggests pre-service teachers were stronger in their use for personal purposes rather than for teaching (Yeung, Lim, Tay, Lam-Chiang & Huit, 2012). However, there has also been research by Mumtaz (2000) that showed a positive correlation between personal use and classroom application. BC agreed that trainers who used technology in their personal lives were more open to it at work than those who did not. GB echoed this sentiment, commenting that "the ones who use it in their personal life are the easiest to move." Although not directly related to the correlation of technology use and application in their training and delivery, RC did mention the experience of using technology at home as being ideal compared to the obstacles encountered in the workplace:

> You do it in your own time, because you have to have the resources to have the technology yourself at home, and then you know it's easy at home because you have your own iTunes account and you can download the apps… transferring that into the classroom is just a different world.

The particular obstacle faced by RC is possibly less common within private RTOs. In public RTOs, the management of personal devices such as tablets and smartphones, which require apps for a rounded experience, has been particularly challenging to implement. For example, in order to download an app, either a credit card or gift card must be attached to an account with an email address as the unique identifier. However, the management of individual corporate accounts on shared devices within public providers means that each app purchase needs to be justified, which can make experimentation for teachers extremely difficult and off-putting. MW did not express an opinion regarding the use of technologies in teachers' personal lives. However, there certainly appeared to be some connection between teachers who used technology in their personal lives and their willingness to engage with technology in the workplace. More research is required to confirm this phenomenon.

The choice to be no-tech or low-tech is quickly disappearing as schools – including, arguably, RTOs – invest heavily in their staff to be able to engage learners of the next generation (Roth, 2014). The fear that teachers may experience, stifling their ability and desire to adopt technology in their teaching, has been likened to previous advancements in history such as the invention of writing (Ribeiro, 2014). This fear has been described as not "monumental, but rather a constant force that causes us to protect and isolate ourselves from the consequences of technological advancement" (Ribeiro, 2014, p.30). In this research, there were some overlapping themes regarding the fear of being replaced by technology. BC stated:

> The research we've done is that the students that are going through online learning have a deeper depth of knowledge than our trainers. So if the trainers don't go through the same program, what they are finding is that they are being challenged when they speak with the students and the students know more than they do.

This can be a very harrowing experience, and can make teachers feel disrespected and undervalued. GB describes the struggle in this way: "I guess there is a fear of technology that people have, and a fear of change, in some cases it's grappling with the 'I can't see how I can use this to get the same outcome'." RC had a similar experience, but more along the lines of between peers, which they described as a 'tall poppy syndrome' situation:

> People who are quick to adopt these technologies and move forward, sometimes the distance between them and their colleagues gets so great that people don't go with them and people tend to isolate and say 'it's ok for that person because they are really innovative.' They almost get held back by colleagues, for some strange reason. I don't know why that is.

This was particularly interesting; as RC could not pin down the reason this phenomenon occurred. More research into professional envy and teacher innovation could provide some much-needed insight. RC further highlighted:

> People are too frightened to change to include technology and do things differently because in the past we have passed audit so let's not rock the boat, let's do what we are doing because we know we won't have to prove ourselves at audit endlessly.

In comparison to the private providers, a possible explanation could be that this was a period of massive reform within the public training providers in Queensland. Therefore, of all the participants interviewed, the majority did have some experiences where their teachers had expressed concern or fear about technology replacing a facet of their roles.

Barriers seem unavoidable

Several interview participants highlighted the issues they experienced with barriers in the adoption of ICT in VET teaching, particularly personal and organisational barriers that impeded progress. Echoing the sentiments above, the need to feel supported was DB's experience: "having the tools and the support of people on the ground to make those changes," was paramount to technology adoption. This was further supported by RB, who stated "I think that we have the opportunity to really embrace that [technology], and move quickly to be responsive, but the organisation we are in is in chains. Not supported or resourced or encouraged to do that."

DR further elaborated that in addition to the lack of infrastructure, the system is set up for failure: "I think when they do push and they do it in the classroom, suddenly it's failed, it's because of the systems we have, and it's very taxing to try it again without support in play."

When asked whether teachers generally wanted to deliver with technology but were impeded by personal and organisational barriers, DR responded that they felt that this was the case for 85% of teachers. They also conceded that there would always be a proportion who would not want to deliver with ICT. This is particularly discouraging, as teachers who do persevere and then fail lack the motivation to make another attempt. In addition, this can have a flow on effect if their co-workers see the effort and decide it is not 'worth the trouble'. With the experiences of the private RTOs, there was no mention of time and resource issues.

The experience of the other public RTO was more organisational, specifically, that monetary restraints were more prominent and their focus was ensuring their industry currency was maintained. GB stated:

> 35-40% of the budget is aimed at teachers embracing technology and e-learning and new ways of delivering… our focus is more on maintaining their industry currency, I suppose, because that is a higher risk to our registered training organisation.

The private RTO experiences of barriers shared similarities with those of public RTOs, but to lesser extremes. One stated that they believed much of the obstacle was "generational." BC added:

> I think, to be honest, that is a generational thing – you know, kids that come through high school in Year 9 are being provided a laptop or iPad. When they get into the workplace the first thing they want is an iPad or a laptop.

This indicated that the experience of learning between the trainers and their learners was different, which affected their ability and desire to engage with ICT. These types of personal beliefs and attitudes were unavoidable.

There had been strong attempts by all participants within their organisation to implement innovative PD initiatives. For example, many tried blocking out time and space in order for teachers to engage with technology without the pressure of performance in the classroom. This is further addressed in the following section. However, the reoccurring obstacle was the availability of time among the teachers' duties to carve out the physical time and headspace to absorb and apply new knowledge. This was more explicit in the responses from public providers. Specifically, the ideal place for this to occur was at home for many teachers because they are not hindered by the organisational information technology policies or common workplace interruptions. Although this is not ideal, it does present an opportunity for rethinking the boundaries in which PD should be completed, which will be discussed further.

Clearly, the barriers experienced by the individual teacher in an RTO can be quite varied. In addition to those obstacles, VET educators must also operate in a system that is not always necessarily set up to make the process of engaging with ICT smooth and pleasant.

Professional development is welcome but constrained by resources

The approaches adopted by the various RTOs in assessing the needs of their staff were varied. The allocation of resources for PD also differed between the public and private providers. Generally speaking, public providers had a much larger workforce to cater for than the small to medium RTOs. GB described their approach as "Aligning performance plans and professional development investment as a more customised approach instead of a broad-brush approach, this is where professional development money is going." Unfortunately, however, this customisation is largely dependent on the "percentage of funding available and funding has been decreasing, and one is affected by the other." This is reflected in RC's and DR's experience at another large public provider: "That hasn't hit us yet, we still have a PD budget, it could be around the corner." RC further elaborated that teachers needed and appreciated just-in-time training:

> Forty-five minute sessions where you just pop in and learn how to use keyboards or how to use Prezi. We are also finding that [when] we have short sharp info sessions and we allow an extra half an hour to 45 minutes for people to actually play with the support of that person doing the training, [that] works well too.

Again, at the time these interviews were conducted, the public providers in Queensland were going through an amalgamation process that involved a streamlining of staff and campuses. The approach taken by the private providers was quite analytical, with BC stating:

> We have personal development plans for each of our trainers, as part of that professional development plan we will look at skills gaps, which varies depending on people's backgrounds, and we make sure it happens by setting aside five days a year.

MW took a completely different approach to all the other RTOs. Their focus was on integrating technology into daily processes. For example, the use of cloud technology like Google Docs, because they have trainers across different states and territories. The idea is to "lift the trainers' skills over a period of time and they are becoming engaged progressively in various technologies that relate to more how we run our business more than how we conduct our learning." It was quite evident that the public providers' ability to meet the needs of teachers has been somewhat hindered by the organisational structures and system itself. They have had to adopt 'broad-brush' approaches and just-in-time learning to support their teachers. Conversely, the private RTOs seemed to be more agile and flexible, with the ability to set up PD plans with staff and follow through with full days set aside for PD.

Here, the differences between public and private providers become more distinct, with a stronger vocalisation of the time and resource issues more apparent in the public RTOs. RC stated that "you can do it in your own time, and finance it yourself, if you can buy it and try it yourself that is fine." This indicates that the organisation is not willing to provide the hardware their teachers need in order to experiment with the technology, and that the onus is on the teachers themselves.

When asked a theoretical question where resources and time was not a concern, what could be done to address the issue of digital competency in VET educators, a clear theme emerged. That was, that they would like the ability to take 'time out', taking staff off their current schedules to provide them the space, opportunity and access to ICT they needed to interact and play with the technology to see how they could apply it within their contexts. BC's approach would be to "take six to 12 months to convert the traditional trainer to e-learning champion, so that is a significant investment, if you like." Others, including GB, preferred an immersion approach:

> My strategy would be that I would immerse them in it as learners, on the other side of it. I think we jump too quickly to, 'right, we are moving this online you have to learn and design it, you put your resources in here, off you go'… Personally, I would turn it around the other way and put a lot of those resources towards saying, 'right, over the next year you'll be learning this through to using these technologies'.

Others, like MW, suggested an action-based approach where a balance was created to allow the teacher to participate in meaningful PD:

> I would… improve the balance between their workload and their professional development, so they would do less work but the work that they would do is very much applied to their professional development in digital proficiency, so probably halve the number of students they're managing and double the time they are spending on professional development.

This was reflected in RC's experience also: "The more project-focused professional development, the better. It's over a period of time and is supported with an outcome and the purpose is not for the sake of learning a new piece of technology."

An interesting point made by a few interviewees was that they believe traditional forms of PD – ie workshops and seminars – still have their place, and can be valuable as triggers for teachers to find out about new things. However, what they believed to be the most valuable was workplace coaching and mentoring, whereby an experienced person such as an instructional designer provides on-site support. In addition to this approach, MW posited:

> [Professional development is] most successful where they are able to apply to what they are learning immediately… the least successful is when someone has gone away for a couple of days, we think they will be learning something that we will get to use in the future, and that person has forgotten or they've left the business.

As can be seen, clear themes have emerged from the survey and interview data in relation to the impact of technology within RTOs and their approaches to PD through the perspectives of educational managers. Chapter 5 analyses the data in response to the research questions.

Organisation tries to cater to all professional development requirements

A reoccurring sentiment from the educational managers, especially those from public RTOs, was their attempts to create PD opportunities that tried to cater to all needs and requirements. Some were quite innovative in their approach, with the creation of spaces for teachers to 'play' with devices. GB describes "the space" as a:

> Teachers' Lounge, which is supported through resources, both digitised and written resources, and also human resources. We have e-learning champions and we help people move into fundamentals like using an LMS with students.

In addition to creating a physical space for teachers, GB also spoke about the importance of developing the digital pedagogical skills and capabilities of their teachers through initiatives like creating a team within the organisation for this very purpose.

> We have a whole unit called 'Innovations,' which really deals with not only the educational strategy side of delivery, but also the technology side for teachers. Its intention is to always understand the technology, and them being able to apply [this] to educational strategy, or knowing the educational strategy and being able to plug in to get that strategy realised.

At the time of the interviews, DR and RC were in the process of gaining approval for their concept of an 'Innovation Hub' where teachers could have a physical space to 'play' and be supported by a learning designer who could provide both technological support and pedagogical advice:

> Our ICT person is saying that what you need is a room where you can do anything… without the fear of breaking the system. You would really need to generate a lot of interest. We are trying to move people to a team teaching concept, that's really where we want to go, we want to try that.

There is a clear trend among public RTOs of moving towards creating a physical space for teachers to develop their digital capabilities, however the trend for private RTOs seems to be towards taking them out of their daily work routine and giving them the time and space to develop skills. It is part of BC's organisations process to plan out five days a year to ensure that PD is undertaken and is as effective as possible.

> Because if we don't, it never happens, so basically, what we do is we have professional development plans for each of our trainers. As part of that plan, we look at skills gaps, which vary depending on people's backgrounds, and we set aside five days a year for coaching excellence programs where we cover a whole host of things.

As stated above, organisation's like the one MW works for have approached PD differently, by integrating the use of actual ICTs into their business processes, such as using Google Docs to "lift" their trainers' skills. They have found that reactions to this approach have been mixed, but it has generally been met with little to no resistance.

> There is a big mix in the experience of our trainers in the use of technology, and I think half of that is a confidence factor, and not much more than that. I'm not finding any resistance to (integrating technology), in fact quite the opposite. I'm certainly finding that they are very open to seeing the need for integrating technology into what we do.

It is clearly evident that all RTOs understand the need to address the digital competencies of their educators; however the approaches taken have varied between public and private RTOs. The public RTOs appear to be opting for the creation of a physical space for experimentation with ICT, while the private RTOs are trying to integrate ICT via their business processes. Regardless of the approach, all RTOs suggest that they are proactively addressing this need in their organisations.

Blended learning is most desirable

MW found that although there was a demand for integrating technology, it may not be what was anticipated: "I would temper that by saying they don't want to lose the human interaction by and large, or they want to have more flexibility in how they learn." The idea of a 'blended' learning approach, where there is a combination of face-to-face teaching and online resources, has recently been utilised by universities (Wong, Tatnall & Burgess, 2014). MW further stated that for their RTO, "a blended approach is the most desirable for learners." BC found that their students were asking for more technology in their learning, to the extent that the RTO has had to educate their employers:

> We are spending a lot of time this year and last year educating employers on what modern apprentices and trainees are looking for when they get into the workplace, and a lot of them aren't aware or don't have the infrastructure to support them.

GB also found that their students had been pushing this agenda through student feedback channels. "Our customers have higher expectations, students have got various levels of, I guess, digital competency, that has had an impact on us understanding that and trying to meet their needs." With the VET teachers themselves, DR estimated that 85% of teachers they came in contact with desired to deliver with technology, but the obstacles they encountered often made this difficult. GB reported a mixed response from their teachers: "I think some have it in their mind that technology is not going to be suitable for their delivery and they might shift only a small percentage unless driven to that point." This was also the case in BC's experience, who had a combination of experiences in the demand of educational technology from teachers:

> We've got some trainers that we predominately use online in the trades, and most are traditionally hands on people… we have another trainer who is probably more experienced in the VET environment, very hands on sort of person, but he doesn't embrace the technologies and struggles with it.

This was further supported by MW's experience: "there is a big mix in the experience of our trainers in the use of technology, and I think half of that is a confidence factor and not much more than that." Therefore, it can be seen that the experiences of all interviewees varied, and that the only consistent factor was the organisations had a demand for blended learning, which came either internally or externally. It is clear that the participants' experiences with PD for their VET educators in public and private RTOs were quite varied. Through thematic analysis, six global themes have been identified which summarise the data collected from the interview participants. As the second point of triangulation, the results here contribute to the accuracy of the findings of this research, which will

be discussed in Chapter 5.

Chapter 5: Findings and discussion

This research aimed to investigate the current state of digital competency of a sample of Vocational Education and Training (VET) teachers in Queensland. The two research questions focused on currently available Professional Development (PD) opportunities, and how these addressed teachers' digital competency capabilities. In the previous chapter, the data collected from the mixed methods approach with VET teachers and educational managers was presented.

The purpose of this chapter is to discuss the findings that have emerged from the survey and interviews, and how these findings have addressed the two research questions. The findings demonstrate that the digital competency of VET teachers and trainers in Queensland is not very strong, and PD does not adequately address this. In order to understand the context of these findings, however, a clear understanding of the limitations faced by this research is first required.

5.1 Digital competency of VET teachers

The importance of VET teachers developing or strengthening existing digital competency skills and confidences directly relates to their ability to develop 21st century workplace ready students. Knowledge of student ICT levels and expectations would provide RTOs and VET educator's clear goals for measurable PD initiatives. In an increasingly globalised economy the quality of skills and productivity of working Australians needs to be of a high standard to remain competitive, therefore today's learners must be educated to the highest level possible (Australian Council for Education Research, 2006). This can only be achieved if educators are equipped with the same skills and professional opportunities, knowledge of student abilities and expectations to guide their PD. This remains a challenge for many organisations.

In today's world, an individual's ability to communicate, share information, adapt and innovate and solve problems using technology provides an advantage in the workplace (Pacific Policy Research Center, 2010). In order to develop these skills within students, teachers themselves must go through a transformative change to gain the skills, knowledge and confidence to complete these tasks; this can be achieved through ICT PD (Russell, 1999). For example, the use of social media and web 2.0 technologies has been seen as a new learning style that allows students to collaboratively build knowledge (Downes, 2005; Anderson, 2007). Therefore, if teachers are equipped with the skills, knowledge and confidence to teach using digital technologies they are more likely to support these capabilities in their students.

The questions posed in the survey were designed to elicit information about VET teachers' device ownership, their ability to complete ICT tasks and their confidence levels in using digital pedagogies. The questions were also mapped to the Technological Pedagogical Content Knowledge (TPCK) and the National Educational Technology Standards and Performance Indicators for Teachers (NETS T) models for measuring teachers' ICT skills. Respondents were then organised into discipline areas (Trades, Community, General Administration and Business) to provide more context to the results.

Device ownership

Laptops had the highest penetration, at 91-97% for all disciplines; this was followed by smartphones, which ranged from 72-83%, with the lowest penetration among those who taught in the Community discipline. Although tablet penetration was expected to be the lowest due to the technology's relatively recent introduction in 2010, those in Business had the lowest tablet penetration – 23%, while General Administration had the highest – 63%. A possible explanation for this could be that those in General Administration tended to have access to tablets on behalf of higher-level managers. Also, those who worked or delivered in the business area are often required to work with programs including Microsoft Word, Excel and PowerPoint, for which working on a tablet is not ideal due to a variety of factors including screen size and practicability.

Those aged 56+ had the lowest smartphone ownership at 66.67% compared with 96.15% of those aged under 35. The mobility aspect of smartphones is further supported by the fact that those aged under 35 also had lower laptop ownership, opting for smaller handheld devices.

An issue that became apparent in the surveys and even more so in the interviews was the trend of Bring Your Own Device (BYOD) in a workplace context. There are several benefits for RTOs to adopt a BYOD policy, as outlined by the National VET E-learning Strategy (NVELS). These include: increased flexibility and access for remote and on-campus learners; opportunities for greater diversity of learning and assessment modes to be employed; and a potential way for RTOs to move towards a 1:1 (learner : computer) practice, without having to invest in large numbers of computers. Conversely, they also outlined concerns including network and data security; access to devices and internet for low income learners; classroom management; how to implement BYOD; and managing appropriate usage (NVELS, 2015).

In the interviews, DR and RC, who were both from a large public RTO, stated that they had experiences where staff found it easier to experiment and 'play' with their own tablets at home than in the workplace. For example, the simple task of downloading an app for a workplace tablet would require teachers to request the purchase of a gift voucher, buy the app using an institute email address and deal with the reluctance of Information Technology (IT) to support them if anything went wrong through the process. In addition, this assumes that the organisation would purchase tablets for them to experiment with in the first place. Tablets are designed to be personal devices; therefore although they may be beneficial in a workplace context, the ability to manage the line between personal and professional use is difficult for the individual and organisation. If a teacher is required to carry two devices, it defeats the purpose of efficiency for that teacher and the organisation. As experimenting and playing with ICT at home is easier for teachers, there needs to be some sort of compromise for staff similar to those allowances afforded when RTOs try to attract students with BYOD benefits. This issue will become increasingly relevant as there is a move towards smaller, smarter and mobile devices like smartphones, which have already achieved an average penetration of 78.92% among those surveyed. Of those aged under 35, 96.15% owned smartphones, which should be a factor considered in future workforce recruitment, as it indicates that younger employees highly value mobility.

The desire for mobility and accessibility is clear within the VET workforce, especially among younger employees. The development of any PD programs targeting digital competency will need to consider the management of devices through a well thought out Digital Rights Management (DRM) policy for VET.

Digital competency using devices and completing tasks

Despite medium to high ownership of smart devices, many VET teachers did not use their devices to their full potential, with several key features of smart devices directly linked to the user's ability to engage with apps. Survey participants were asked a series of questions about their ability to complete basic and intermediate tasks using laptops, tablets and smartphones. The results strongly indicated that most were confident using laptops, but less confident with tablets. Furthermore, around 20% of respondents could not complete basic tasks like managing their calendars on a laptop. Interactions with apps and social media were not impressive, with 37-50% of respondents reporting they were unable to download music and apps, make Skype calls or tag themselves on social media. Interestingly, the ability to shop online had the highest level of completion – 92%. This could be attributed to the proliferation of the payment processing system BPAY, which was first introduced in 1997 (BPAY, 2015).

Referring to Table 4.12, page 65, the intermediate tasks were chosen for their ability to be transferable to an equivalent VET workplace comparison. For example, if a teacher can pay a bill online they should also be able to fill out and submit an online form. Of all the intermediate activities, the weakest areas were teachers' abilities to create their own blog, wiki or online community (40.80%), develop a website (27.70%) and create an eBook (14.60%). Using Bloom's revised digital taxonomy (Anderson & Krathwohl, 2001), where teachers were asked about their ability to apply their ICT skills in higher order thinking like 'creating', this was the weakest area for respondents.

As the apex of the taxonomy, creation of content was found to be the most difficult task, which provides an ideal area for PD. Explanations for this are varied. One possibility is that the task of creating learning content is no longer the domain of the VET teacher – that is, with the introduction of roles like instructional designers and multimedia developers, the role of the teacher remains that of a subject matter expert, meaning they are not involved in the actual development of learning resources. As such, their focus regarding ICT development would be towards delivery, where they were able to achieve a higher completion rate of 52-79% for tasks such as *contributing to* (not creating) a website, blog or chat room, adding animations to PowerPoints and editing PDF forms. Another possible explanation could simply be that 'creation' presents the same challenges for teachers as it does for their students. Therefore, any PD programs should also consider that a percentage of the VET sector still needs support in basic level tasks, while there is also a need to cater to those who are more advanced. It is through experiencing a higher level of engagement and creation that will likely benefit the learning experience of their students.

Younger respondents were more capable of completing intermediate tasks compared to their older counterparts; this was evident across all devices. Again, this is another consideration when recruiting staff, as the results here clearly demonstrate that younger VET employees are more confident and capable with ICT. However, as previously stated, they are also more likely to leave the sector (NCVER, 2009, p.31). A possible reason for this

could be that those in Trades tended to interact with more forms of technology than other disciplines, for example machines, tools and drafting software. Therefore, those working in Community would be ideal for a PD intervention, which will be discussed in Section 5.3.

Interestingly, while those who held postgraduate qualifications tended to own devices, they could not use them as well as those with lower qualifications. This was particularly evident with tablets and smartphones in completing the more intermediate tasks, with those who held a Bachelors or Certificate scoring higher. It was in fact those who held a Certificate level qualification who were more capable than the other qualification levels. This could be due to the fact that those who actually used the devices were administration assistants who tended to have lower qualifications and organised their managers, but were younger in age and as indicated by the results, more capable of using tablets and smartphones. Another possible explanation is that older VET teachers were more highly qualified and in terms of teaching experience and have professionally developed their knowledge and skills in a less ICT prevalent environment. Whereas, younger VET teachers have been surrounded by ICT in their personal and professional lives and only require a Certificate IV Training and Assessment to teach in the same context as their older counterparts.

The overall capability of a sample of VET teachers in Queensland to complete tasks using various devices is quite mixed, with most managing laptops quite confidently, but being less confident with newer devices like tablets. Here, the results show that the younger members of the VET workforce who are less qualified are also more digitally capable than their older counterparts. This makes them an ideal target group for professional and career development to ensure they have the skills and expertise to fill future skills gaps. Additionally, the results highlight the need for PD programs to continue to cover basic ICT skills, as a portion of the VET workforce still struggles with these fundamentals.

Digital competency confidence levels

Of the 39 questions asked, 14 were scenario-based Likert questions developed and organised into four main elements of TPCK: Technological Knowledge (TK), Technological Pedagogical Knowledge (TPK), Technological Pedagogical Content Knowledge (TPCK) and Technological Content Knowledge (TCK). It was clear that teachers felt the most confident in TCK and felt that TPCK was their weakest capability. As the most complex skill in TPCK, this indicates that PD should target TPCK in particular. Using a scale of 1 to 5 (Not confident at all, Somewhat confident, Fairly confident, Quite confident, Completely confident) the following were achieved:

- **TK scored 3.66**

  The results indicated that those who held a postgraduate or Bachelors level qualification were more confident in TK than those who held a Certificate. Men were generally more confident than women, and those aged over 46 were more confident than their younger counterparts. It is evident that VET teachers are generally confident with their ability to learn, use and demonstrate technologies to their peers and managers. A possible explanation could be that through industry requirement and necessity, teachers are often asked to attend workshops and conferences about new machines and tools. They are also asked to share what they learn when

they return with the organisation. As one of the less difficult elements of TPCK, a score of 3.66 is not particularly strong and indicates that PD should still target low-level technology integration with VET teaching and training.

- **TPK scored 3.18**

Similar to that of TK, TPK results indicated that teachers aged over 46 were more confident than younger age groups. Men were more confident than women. A possible explanation for this could be that those who are generally older have been in VET for many years (15+), therefore their knowledge regarding how to integrate technologies into their delivery could outweigh that of their younger counterparts. Any future PD would need to target the weak results here, as this demonstrates that VET teachers need more training in how various technologies can be used in their delivery, as well as how they can change the ways they teach.

- **TPCK scored 3.13**

This was the weakest capability of VET teachers from the research results. It is also the most complex element of TPCK, which requires teachers to have an intuitive understanding of the three main components of TPCK (CK, PK, TK). This sub-optimal result indicates strongly that PD should target CK, PK and TK, and progress towards TPCK. Interestingly, although this was the weakest score, it was also the only TPCK element where women felt more confident than men. This indicates that although female VET teachers may not feel as comfortable with the individual elements that make up TPCK, they are confident in the overlay that the three areas represent. Therefore, any PD program for women in relation to TPCK should focus on building their foundational understanding of CK, PK and TK.

- **TCK scored 3.94**

Here, there was no statistical significance between men and women, qualification levels or disciplines. However, again, those aged 45 and above were more confident than other age groups, with those aged 56+ the most confident of all.

The reported levels of confidence and their relation to actual ability would require further study; however there have been high correlations between self-efficacy as a strong predictor of behaviour (Bandura, 2006). This is further supported by Abbitt (2011) in an investigation which showed high self-efficacy beliefs led to actual use of digital technologies for teaching. Researchers Wozney, Venkatesh and Abrami in 2006 found that there were two main factors that affected the adoption of technology into teaching practices; they were confidence and perceived value of the technology being used. This is reflected in the results here, when combining the confidence results above with the use of devices, a strong pattern clearly emerges. Younger VET teachers and trainers are more confident in their ability to use smart devices like tablets and smartphones. However, when it comes to applying these skills to their teaching delivery, they are not as confident as their older counterparts. Conversely, it is the older VET teacher (particularly male) who are confident in their knowledge of integrating technology into their teaching and training, however they are limited by their capabilities with using certain technologies. Hawley and Valli in their 1999 research into the essentials of effective PD identified opportunities must be given to teachers that help reinforce the underlying theory of the knowledge and skills they are being asked to develop. They also highlighted that what will

work for one may not work for all, the key is that teachers will have developed the confidence through understanding the theory to apply and adapt this new knowledge to their own context. This idea was further supported by Invargson who stated "change in practice is more likely to be pervasive when it is informed by theory in with the educator involved has confidence" (2005, p. 69). Therefore, it is evident that TPCK is where the future of PD should be focused and a rethinking of how RTOs developing these skills within VET educators is required. The approach must be flexible enough to address the diversity of the VET workforce and firm enough to ensure the value of technology in learning is demonstrated. PD offered around educational technology should be a driving factor that ensures the RTO is competitive, institutionally viable and attractive to learners.

The survey results here indicate that the overall digital competency levels of Queensland VET teachers are below average. With average results of 3.66 (TK), 3.18 (TPK), 3.13 (TPCK) and 3.94 (TCK), there was a clear trend that as teachers are asked about content knowledge that focuses on the teaching process, they are far less confident. As the most difficult element of TPCK, TPCK is where future PD must focus. VET teachers have the ability to learn about new ICT; however, when asked to apply them within a pedagogical context, their confidence levels decrease. Short-term workshops and conferences to develop skills such as synthesis and creation are not ideal; therefore, a rethinking of how to develop these skills in VET teachers requires further research. Investigation into improving TPCK confidences in VET teachers including workplace and e-mentoring, communities of practice and experimental spaces would be worthwhile. The results here are limited by the fact that more research is required across other RTOs in different states and territories in order to make meaningful comparisons. However, it is clear that PD strategies need to target the fundamental elements of TPCK, focusing on CK, PK and TK, in order to encourage higher level capabilities like TPCK.

5.2 Professional development in the VET sector

The survey provided some opportunities for respondents to answer non-compulsory open-ended questions about their PD experiences. Their answers were further supported by the interviews with educational managers. The data collected from the interviews was thematically analysed, and the results have been combined here with the survey results to provide an overall picture of PD in VET.

Viability of RTOs is paramount

The strongest theme that emerged from the interview data was the need for RTOs to be economically viable. Without this organisational imperative, everything else was moot. Organisations have had to change the way in which they conduct their business, including how much they are able to invest in PD. For example, instead of planning 5 to 10 years ahead, they must now plan yearly and have the flexibility to change direction when required simply because technology changes so rapidly. This sentiment was strong across public and private providers due to the legislative changes in Queensland VET in recent years, including User Choice, contestable funding and the amalgamation of TAFE Queensland (refer to Chapter 1.2: Background and context, page 12).

The impact of emerging technologies in the RTOs interviewed varied, with some reporting significant impacts and others more gradual impacts. The pressure to ensure that RTOs meet market demands including flexible and blended learning has meant that choosing the right technology at the right time to invest in is crucial to organisational success. RTOs need to make evidence-based decisions in the face of internal (organisation and employee) and external (student and competitor) pressures. These pressures will most likely become more prevalent in future years, with learners who have completed their school education with the benefit of the Digital Education Revolution (DER) program now trickling through to VET and higher education. These learners' expectations regarding their teachers' digital competency levels and the flexibility of the organisation may become a factor in their choices (Bailey, Ifenthaler, Gosper & Kretzschmar, 2014).

All respondents agreed that the use and integration of ICT was no longer avoidable and had become part of their ongoing planning and resource allocation. They saw their competitors' use of ICT as a distinguishing feature to attract students who desired the flexibility of different modes of learning. This was reflected in their belief that the blended learning approach – where teachers offer face-to-face as well as online experiences to their learners – was ideal. The task of addressing this blended learning strategy to satisfy internal and external demands will require a rethinking of PD approaches.

Current professional development opportunities in VET

There was a great tension and mismatch of perspectives on PD between educational managers and VET teachers. The educational managers interviewed were all positive about their PD approaches, with several developing innovative programs of their own to help address the digital competency of their staff. However, the majority of teachers surveyed indicated that PD attended by Queensland VET teachers was not particularly relevant. Therefore, while those tasked with managing and organising PD believe they are providing relevant and adequate PD to their staff, many of the staff felt quite the opposite. Any future PD for VET teachers should be consultative to ensure the aims of the organisation match the requirements and needs of employees.

The surveyed public RTOs tended to lean towards creating a physical space with devices for teachers to experiment with, in the hope that they would apply their new knowledge and skills into their teaching and delivery. Private RTO programs in this research focused on taking teachers out of their daily work routine and placing them in intensive programs that would help expedite the development of digital capabilities. However, the results from survey respondents indicated that the reality was different. Of those who responded to PD related questions, 1 in 5 stated that they had not attended any PD in the last six months. More than half of these held a postgraduate qualification. As already stated, more men than women did not attend PD. This could possibly mean that those who held higher-level qualifications and perhaps were in managerial positions were not setting the example of continuous learning and PD for their employees. However, due to the small sample size, more research would be required to see if these results can be replicated in other RTOs.

The interviews indicated that teachers needed to *feel* and *be* supported, which came across most strongly when discussing the intersection of teachers' personal and professional use of technology. Research has suggested that

teachers who use technology in their personal lives tend to be more capable using ICT for teaching (Yeung et al, 2012). This seems to be the case within VET also, with DR and RC indicating that their teachers could achieve far better experimentation with devices at home than at work due to organisational barriers including access and lack of Information Technology (IT) support. Therefore, it is not as simple as providing the piece of technology to teachers by the organisation (Keengwe & Kang, 2012). It is through a combination of the teachers seeing value in the adoption of the technology and their willingness to embed its use within their pedagogic context (Younie & Leask, 2013), grounded by a feeling of support that their organisation supports this goal and the effort required.

Despite the previous discussions around BYOD for learners and teachers, there also need to be discussions around the commitment and ownership of lifelong learning. The intersection between personal and professional is a complex one, however, the need for teachers to engage in lifelong learning themselves is crucial to their ability to thrive in a 21st century learning environment. Researchers have discussed the effect of learning that occurs with students outside the classroom through using the internet. Teachers themselves can "extend their instructional leadership roles to situations that lie beyond pedagogies traditionally associated with the classroom" (Katyal, 2012, p. 65). For example, many students' first port of call to answering a question is to "Google" it. This approach to learning encompasses several levels of Blooms Revised Digital Taxonomy, as searchers are required to understand, apply, analyse and evaluate the information they come across. These principles can also apply within a teacher's learning experience and interaction with ICTs. Thus the responsibility of PD extends to VET teachers themselves owning their lifelong learning, which must be met with support from their organisation.

Current PD opportunities available to Queensland VET teachers *are* contributing to the development of digital competency levels. However, these PD opportunities are often reprioritised after activities that ensure the viability of the business. Despite the pressure to remain competitive, RTOs are endeavouring to provide PD opportunities that support their staff. However, the results of this research indicate that there may be a mismatch between the organisation's actions, and the results experienced by staff – some of whom indicated there was a lack of PD opportunities, and that PD often lacked relevance. A balance between the PD approaches undertaken by public and private RTOs is required so that teachers' PD is not isolated to set events like workshops and conferences at a point in time, but rather is integrated into their daily work routines. In such an environment, PD activities could be more targeted, relevant and practical, rather than broad, irrelevant and theoretical.

Barriers to engaging with professional development in VET

As a result of the data collected from the survey and interviews, other factors that affect the uptake of future PD include, but are not limited to:

- **Personal and organisational obstacles to PD and ICT uptake** – several interviewees felt that barriers to ICT adoption would always exist due to a variety of factors including access to technology, organisational systems and processes, and personal reluctance. In order to tackle these barriers, there must be champions in the workplace willing to address them head-on. For example, one respondent shared an example where teachers had persevered to implement an ICT initiative and failed. This failure

was witnessed by other teachers who therefore did not see the value in challenging the established system. Of course, organisations can only go so far with their efforts. While educational managers have tried to implement programs that allow teachers to experiment with technology, if teachers do not use these spaces, the justification for more resources towards these initiatives will be severely diminished. PD programs need to help create a culture of ownership and responsibility of the individual teacher as well as the organisation. There is value in exploring alternative and current approaches to learning that take advantage of the vast resources afforded by tools like the internet. For example, as part of empowering and encouraging the ownership of lifelong learning and development, teachers must place themselves in the position of their students when it comes to problem solving (Katyal, 2012). This, however, requires the teachers themselves to be open to new ways and understandings of how and what the internet offers as a learning and teaching tool. Teachers can no longer rely on traditional pedagogies that are closely tied to the physical classroom (Katyal & Evers, 2004a, 2004b), and must apply these new concepts in their own learning.

- **A 'spray and pray' approach will not suffice** – PD can no longer be a forum for disseminating one-way information so that the organisation can place a tick in the compliance box. Developing PD for a diverse workforce such as VET requires PD to be equally diverse. The obligation is for the RTO to offer PD programs that cater to different requirements. In turn, VET teachers must not attend passively, but rather actively engage and provide productive feedback. This will prevent situations such as those highlighted by this research project, whereby educational managers feel they are optimistic and progressive with their PD approaches, while their staff state that the PD they attend is not that relevant.

- **Blended learning requires VET teachers to be digitally competent and capable** – Just as RTOs are offering blended learning for their students, they must also provide flexible approaches to PD for their staff. The shift away from traditional forms of PD like workshops and conferences means that a strong desire exists for PD that is not bound by a physical location, but rather is integrated and seen as part of the teaching role. In order to offer blended and flexible learning experiences, staff within RTOs must themselves be capable and remain current through lifelong learning practices. This is an area that needs to be developed in the workplace culture. For example, managers who hold postgraduate qualifications and do not attend PD send a message to their staff that PD is not *that* important.

Desired professional development opportunities in VET

Queensland VET teachers expressed a strong desire for more PD that addresses their digital competency and pedagogical knowledge and skills. Of those who responded to this non-compulsory question, almost half identified digital pedagogies and ICT as the most in-demand future PD. The Trades desired this type of PD the least, with Business taking the lead, followed by General Administration and lastly Community. Interestingly, the survey indicated that the Trades were the most digitally confident and capable, and that they had the strongest desire for PD in general; however they were also the group with the highest no response rate to this question. The Trades may be more vocal about more PD, however they are not as forthcoming with letting the organisation know what

PD they desire. PD targeted at Trades would need to consider that they might require more follow up than others for greater PD uptake. Taking into consideration the results from above, the Community area seems to be the most ideal target group for a PD intervention. They were the least digitally confident and competent, and had a strong desire for PD in digital pedagogies and ICT. The group would need to be split into those who were quite advanced (ie those aged under 35) and perhaps those who still struggled with the basics of ICT, coupled with the possibility of peer mentoring.

Providing teachers the technology, time and space to 'play' and 'interact' with technology was a highly desirable for the interview participants, especially those who've had limited interaction with educational technology. This focus on experimentation and engagement with the use of technology has been identified as an ideal approach to PD for public and private RTOs (refer to page 78-80). This has been supported by research whereby teachers are given opportunities to play (Somekh, 2008), experiment and reflect on their activities without the pressure of it being applied in a 'real-world' context so they can build from small successes to greater ones (Ottenbreit-Leftwich, 2007). This approach would be best suited to targeting VET teachers that have been reluctant about ICT and would like to see how it can be applied in a non-educational context before demonstrating its potential applications for education. Although this type of approach is costly to the organisation it is necessary in order to give the teacher's time to develop and integrate the new practices (Hennessey, Ruthven & Brindley, 2005). This is reflected in the sentiment expressed by DR and RC where by the focus of PD resources are on industry currency which is what ensures the continuity of the business. Thus, as can be seen, there is a strong desire for PD that focuses on digital pedagogies and ICT among Queensland VET teachers. However, the complications in developing PD that addresses this need in a diverse VET workforce make it a challenging task for RTOs to address successfully. Alternative approaches the VET sector PD could benefit from through further exploration could be identifying existing ICT capable VET educators to be champions in the organisation. Also known as 'home grown experts' who are able to provide on location support and are more relatable to other educators as they themselves work within the same constraints (Watson, 2001). Building upon this idea, using the knowledge and skills of an instructional designer who has the educational underpinning as well as the ICT skills as an in-classroom mentor could alleviate the pressures of a teacher testing out ICT in their delivery. This approach was identified as desirable by some interviewees. Therefore it is evident that VET teachers need to take ownership of their own learning. In order for organisations to support their staff they must instill a culture of lifelong learning in their employees and acknowledge and be open to different PD approaches that address the varied levels of digital competency within the organisation.

Despite the demand for PD focusing on developing ICT skills of VET teachers, workloads, past experiences of failure and wide-spread organisational restructuring can contribute to disengagement with PD. RC (interview participant) identified that it was sometimes simpler for teachers to engage with technology at home because they did not have the complications of IT policy to adhere to. There were also reports of workplace fatigue with self-motivated VET teachers actively pushing an ICT agenda only to fail because of the systems in place and therefore becoming less encouraged to try again. In addition, the overarching changes to the VET sector in Queensland throughout the past 18 months have contributed to an atmosphere of uncertainty as TAFE Queensland (the largest RTO in the state) becomes a statutory authority (refer to Appendix H on page 139 for timeline of reform).

Therefore the reasons as to why there are barriers to engaging with PD in VET can be quite varied and difficult to resolve for the organisation and the individual.

5.3 Summary

This study was significant as the Queensland VET sector is an educational context that has not had as much academic scrutiny in relation to teachers' digital competencies and how PD addresses these competencies. By creating a baseline of information regarding the digital competency of Queensland VET teachers and their PD activities and behaviours, it contributes important information for policy and practice for those interested in improving these competencies in VET teachers.

The PD teachers receive directly relates to their capacity and ability to integrate technology into their teaching and learning (Watson, 2001). The findings here strongly demonstrate that there is a *need* and *desire* from VET educators to engage with ICT, but there are diverse and significant barriers that must be overcome by the individual and organisation. Similar to the findings of Meredyth, Russell, Blackwood, Thomas and Wise in 1999:

> While many teachers have developed basic information technology skills, they may not be extending them in ways that are likely to fundamentally change the ways they teach, or in ways that will enable the use of computers as other than relatively low-level educational tools (p. 336).

Here, VET teachers scored the weakest in TPCK overall and the highest in TCK which indicates that although they are confident in their content knowledge, however when asked to apply this in a pedagogical with ICT the confidence drops. Watson, Taylor and Russell (1995) suggests a five-stage reform model starting at orientation, adoption, evaluation, innovation and finally institutionalisation as the final goal where ICT becomes the 'norm' in practice. The complexity for organisations is to address each stage of the model in a PD program as the results from this research indicates that there are teachers in all stages. What this research highlights is that the state of digital competency of surveyed Queensland VET educators is currently 'average', therefore adopting Watsons (2001) argument, the PD they have received to address ICT capability has not been particularly effective. Adoption and instituationalisation of ICT in teaching practice is a transition that is much more difficult than it seems as it is often bundled with issues of culture and organisational systems that require a paradigm shift of how teachers (and to a certain extent administrators) think about learning (Poole, 1995). However, the reasons as to why current PD approaches are failing or succeeding in Queensland VET would require additional research. The research provides a springboard for future research that goes beyond participants self-report of ICT use, which is a limitation addressed further in this Chapter.

The digital competency of Queensland VET teachers and trainers can be characterised as not very strong. Current PD opportunities available do not adequately address teachers' digital competency needs, and there is significant room for improvement.

Recommendations include:

(i) Developing a NAPLAN equivalent program for VET to help address quality issues within VET

There are challenges in creating entry requirements into VET teaching that balance the need to attract skilled experts from industry and a consideration of how VET can ensure the quality of its teaching staff. With the development of a national program like NAPLAN for VET teachers, much needed information could be provided to existing and potential VET students. Not only does NAPLAN provide national testing of students and results, it also collects data on the institutions and their employees, which, if applied in the VET context, would help to fill existing knowledge gaps about the sector.

(ii) Building compulsory reporting requirements for VET into AVETMISS as recommended by NCVER to collect annual data on the VET workforce

Although there have already been efforts made by NCVER towards integrating VET workforce data into AVETMISS reporting, this has not been fully realised. It is hoped that this objective will be fully realised in the coming months.

(iii) Professional development interventions for VET teachers working in the Community discipline

It is evident from the research results that those who would benefit most from an immediate ICT PD intervention are those who work in the Community based disciplines. These teachers tend to be older, hold higher qualifications, have smart devices and have lower digital competency and confidence levels than other discipline groups. This group also indicated an openness towards PD that presents an opportunity to test out e-mentoring and communities of practice pilot projects.

(iv) TAFE Queensland-wide discussions regarding the recruitment, retention and promotion of career pathways for younger talent

The issue of an ageing VET workforce needs to be brought to the forefront and discussed at a higher level. While there have been efforts towards collecting workforce data in TAFE Queensland – such as the 2015 survey, which highlights the need to retain younger workers – greater and more aggressive efforts towards VET legacy planning are required to ensure a strong VET future.

(v) Building upon the basic technological foundation skills of all VET teachers

It became evident from the results that while younger VET employees were more confident and capable at using smart devices, they were not as pedagogically strong in implementing them into their teaching and training. The results were the opposite for older VET teachers, who were capable of understanding how technology could be applied, but held back by their ICT competency. Future PD programs need to cater to the different development needs of VET teachers by building a basic technological foundation for all teachers to expand upon.

5.4 Limitations

There were some limitations experienced during this research study, including the problems of generalisations from the data collected, sample size, verification and participants. The participant sample size in the survey was not particularly large, and the chosen interview participants were five individuals from small to large RTOs. Their views, beliefs and attitudes were also researched at a point in time where there had been major reforms in their industry, and research at another time may have yielded different responses given the fast-paced nature of technological change. This smaller sample could also be expanded through further research to explore if these generalisations are indicative of the larger population.

The survey was made available Queensland-wide; however the majority of respondents were from the metropolitan areas of Queensland, with limited representation from rural areas. In addition, the survey was self-report with no objective verification of competence. However, the focus of the research was to create a baseline understanding of educational technology use and confidence in Queensland VET teachers. Therefore, while the verification of *actual* ability in the use of ICTs in VET was a limitation of this research, the findings provides a solid foundation for future research. The interviews were only conducted with those in the Brisbane metropolitan area; again, research from other VET sectors from other locations could yield different results. Creswell (2012) states that when using a mixed methods sampling approach, it can dangerous to stereotype the participants into categories. Generalisations are difficult due to the limited number of responses to the survey. This should be considered when evaluating the research.

In addition, the lack of publically available data regarding the national and Queensland VET workforce at a severely limited the discovery of possible explanations as to why the VET workforce is in its current state. While there is no doubt that some RTOs collect this type of data internally, without publication, comparisons and discovery of patterns cannot be made.

The use of a survey with mostly close-ended questions may also limit the validity of the data, as participants must choose an option even if there are no suitable options that reflect their actual view. Although the data collected was from one of the largest VET providers in Queensland, it was completed during a time of massive reform and organisational restructure. Therefore, views from other VET teachers from another area could produce very different results. However, the findings from this research will provide useful information that can potentially lead to a more wide scale application of research in this area.

5.5 Future research

The seven main areas for further research that have emerged from this study are:

(i) The effectiveness of the Certificate IV Training and Assessment as the baseline qualification to teach in the VET sector

The digital competency requirements for the Certificate IV in Training and Assessment are currently covered by an optional elective. In order for VET teachers to compete, work effectively and deliver using 21st century tools and technologies, it stands to reason that the baseline qualification should have these requirements as part of the core, and not elective, syllabus. As the requirements for learners to be more 21st century-ready, so too must the qualifications of VET teachers who are tasked with preparing them for the 21st century workplace. More research is required to identify the core digital competencies that a VET teacher must posses, which evolves and develops as the teacher progresses through their career.

(ii) National registration of VET professionals

The schools sector has a mandatory requirement for teachers to register with the appropriate authority before commencing teaching. There should be research into whether this approach would benefit the VET sector despite the diversity and difficulties of tracking such a workforce. The focus should on improving the quality of VET teachers nationally as well as collecting much needed data on a retiring workforce. Such an approach would particularly help with knowledge gaps about the national VET workforce.

(iii) Recruitment and retention strategies for younger VET employees

To successfully address the issue of an ageing VET workforce set to retire in the next few years, it would be pertinent to research the current intentions and motivations of VET employees aged under 35 who are best placed to fill this gap. As indicated by the research results, these employees are the most digitally competent and confident, and it would be a waste if this talent were not nurtured to ensure the VET sector flourishes beyond the expected retirement of the majority of its current workforce.

(iv) VET workforce data collection by RTOs

Due to the lack of publically available data experienced throughout this research project, it would be highly recommended that there be research into the specifics of what RTOs actually collect internally. For example, is workforce data separate to human resource requirements being collected, and, if so, by whom, what and how? Most importantly, is the data publically available, and, if not, why? The questions outlined by the NCVER in their 2014 submission to the VET Taskforce would provide a strong starting point as to the kind of data that should be collected.

(v) Development of a scale designed to measure the motivations of becoming a VET teacher

The creation of a scale equivalent to the *Factors Influencing Teachers Choice* scale by Watt and Richardson (2006) for the VET context would assist the sector in its staff recruitment and retention planning. The information gathered by the scale would also assist in workforce planning and PD programs by gathering data that mapped the career pathways of VET teachers. This would provide valuable information on the qualities that attract potential VET teachers and insight for VET policy and decision makers in legacy planning.

(vi) VET teachers taking ownership of their lifelong learning by adopting a 'we learn best from the internet' approach

There is an opportunity to build on the work of researchers like Katyal who advocate that teachers themselves can learn from how their students learn by using the internet as a "parallel learning system" (2012, p. 69). Combining this approach with the concept of lifelong learning in VET teachers, this research would provide insight into how the non-traditional learning approaches adopted by modern students could benefit teachers' approaches to their own learning. Such approaches such as PD intensives where teachers are taken out of their classroom environment to develop their understanding of digital pedagogies and how to achieve satisfaction with ICTs. Other recommended strategies to investigate would be the use of educational technology champions who act as evangelists that support VET teachers in the classroom with ICT support and implementation. Due to the diversity of the VET workforce, a 'one-size-fits-all' PD solution will not be as effective as exploring alternative methods of delivering training to VET teachers.

(vii) Apply and compare the key findings from this study to other registered training organisations

As noted in the limitations to this study, this research was undertaken in a Queensland vocational setting, which had a large sample of public provider participants, compared with private providers. To identify if these key findings are consistent with other vocational institutes, further research is required. This would provide further validity and confirmation of the findings found in this research and therefore contribute to the overall understanding and planning of how PD is resourced within the Queensland VET sector.

Conclusion

The purpose of this research was to understand the digital competency levels of Queensland VET educators and how current PD efforts are serving this objective. As technology continues to change, so too must a VET teacher's ability to adapt and capitalise on the benefits offered by ICTs. Trends indicate that future generations have a reliance on accessing information at anytime, anywhere. Despite the growth of ICT use globally, the fundamentals of technology use and how they can be applied in a VET context are still largely unknown and not well investigated. It is recommended that future PD programs target the fundamentals of TPCK – CK, PK and TK – in order to create a strong base for teachers to move towards TPCK. PD on digital technology is crucial in developing the overall competency of VET teachers and therefore supports the RTO itself in remaining competitive, attractive to learners and institutionally viable. The Community discipline would be an ideal test

group for PD interventions like e- mentoring, communities of practice and experimental spaces.

The broader issues within Australian VET such as a lack of consistent national reporting requirements and publication hindered this research. It is recommended that existing compulsory national reporting protocols for RTOs such as AVETMISS be built upon, and that a NAPLAN equivalent for the VET sector be developed. The collection of this type of information would also provide valuable data on recruitment and retention of VET talent.

The research results show that VET teachers are already engaging with ICTs with various levels of success. RTOs are also actively offering alternative PD experiences for their staff in order to address ICT skills development. In addition, there is also a strong demand for PD targeted at improving teachers' digital pedagogical knowledge and skills through a variety of non-traditional PD approaches such as play and experimentation. Despite these encouraging results, the VET sector has challenges it must overcome in order to improve its ICT implementation. For example, the non-compulsory reporting requirements of RTOs limits the understanding of how VET is addressing the need for ICT PD. Therefore, it is evident that while the organisation and the individual are willing and ready to engage with building digital competencies, finding an approach that best serves both parties remains a challenge.

This study is significant as the Australian VET sector – and particularly the Queensland VET workforce – is an educational context that has not been explored in current literature in relation to teachers' digital competency levels. Identifying Queensland VET teachers' current levels of digital competency will help to inform policy and practice for RTOs for allocating their resources more effectively as they operate in a vastly competitive environment.

In conclusion, a VET teacher's ability to develop their ICT capabilities remains closely linked to the PD they themselves receive, and their personal willingness to take ownership of their learning. This ownership must be supported by the organisation, particularly in the development of policies that encourage lifelong learning habits in employees. A workable balance must be struck between the allocation of resources towards the viability of the RTO and the adoption and understanding that PD in VET can never be a one size fits all solution.

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Appendix A: Table of research on digital competence of teachers

Sources	Author's discipline	Education level	Standard/measure used	Country	PD?
Oster-Levinz, A & Klieger, A,.(2010)	Computer Science and Education	Higher education	TPCK –Technological Pedagogical Content Knowledge	Israel	Y
Mostert, M & Quinn, L. (2009)	Information technology	Higher education	TPCK –Technological Pedagogical Content Knowledge	South Africa	Y
Schmidt, D.A., Baran, E., Thompson, A.D., Mishra, P., Koehler, M.J., Shin, T.S. (2009)	Educational Sciences	K-12	TPCK –Technological Pedagogical Content Knowledge	USA	N
Konan, N. (2010)	Education	K-12	European Computer Driving License (ECDL)	Turkey	N
Guo, R.X., Dobson, T., Petrina, S. (2008)	Educational Computing and Language and Literacy Education	K-12	International Society for Technology in Education's National Educational Technology Standards (ISTE NETS 2000)	Canada	N
Krumsvik, R.J. (2008)	Education and Health Promotion	K-12	Network for IT Research and Competence in Education	Norway	N
Cartelli, A. (2010)	Human Sciences	Unspecified	DigEuLit – European Framework for Digital Literacy	Italy	Y
Wen, J.R. & Shih, W.L. (2008)	Information Managemen and Industrial Technology Education	K-12	International Society for Technology in Education's National Educational Technology Standards (ISTE NETS 2000)	Taiwan	N
Pianfetti, E.S. (2001)	Education	Unspecified	International Society for Technology in Education's National Educational Technology Standards (ISTE NETS 2000)	USA	Y
Probert, E. (2009)	Education	K-12	Unspecified	New Zealand	N
Jamieson-Proctor, R.M., Burnett, P.C., Finger, G & Watson, G. (2006)	Computer Science	K-12	ICT Curriculum Integration Performance Measurement Instrument	Australia	Y
Jun, H. & Zhuzhu, W. (2010)	National Centre for Educational Technology	K-12	Ministry of Education (China) – National Education Technology Ability Standard	China	N

Appendix B: Survey

DEMOGRAPHIC INFORMATION

Age:	
Male/Female:	M/F
Organisation:	
Faculty/Teaching area:	
Position title:	

1. What best describes your role within the organisation?

Please select only ONE response

☐ Teacher/Trainer
☐ Administrator
☐ Content developer
☐ Manager
☐ Subject matter expert
☐ Other: _____

2. Length of time working within the vocational education and training sector?

Please select only ONE response

☐ 1 year or less
☐ 2-5 years
☐ 6-10 years
☐ 10-15 years
☐ 15+ years

3. Was the majority of your time spent in the public or private sector?

Please select only ONE response

☐ Public sector
☐ Private sector
☐ About 50/50

4. Are you a mostly a PC or MAC user?

Please select only ONE response

☐ PC
☐ MAC
☐ PC and MAC
☐ Neither
☐ Other: _____

5. What is your highest level of completed education?

_____

6. Do you own a laptop/notebook?

Please select only ONE response

☐ Yes (go to question 7)
☐ No (go to question 8)
☐ I only have a work one
☐ I have one provided and a personal one
☐ Other: _____

7. Have you ever used your laptop to complete the following tasks?

Please select only ONE response

☐ Send a text message with multimedia? ie image/video/audio
☐ Downloaded an App? ie iTunes/GooglePlay
☐ Downloaded music? ie iTunes/GooglePlay
☐ Make or receive a video call? ie Skype/FaceTime
☐ Manage your calendar?

☐ Tethering or hotspotting?

☐ Uploaded an image to social media? ie Facebook/Twitter
☐ Tag yourself and others on social media? ie Facebook
☐ Check-in to a location on social media? ie Facebook
☐ Other: _____

8. Do you own a tablet device? ie iPad

Please select only ONE response

☐ Yes (go to question 9)
☐ No (go to question 10)
☐ I only have a work one
☐ I have one provided and a personal one
☐ Other: _____

9. Have you ever used your laptop to complete the following tasks?

Please select as many responses that apply to you

☐ Send a text message with multimedia? ie image/video/audio
☐ Downloaded an App? ie iTunes/GooglePlay
☐ Downloaded music? ie iTunes/GooglePlay
☐ Make or receive a video call? ie Skype/FaceTime
☐ Manage your calendar?

☐ Tethering or hotspotting?
☐ Uploaded an image to social media? ie Facebook/Twitter
☐ Tag yourself and others on social media? ie Facebook
☐ Check-in to a location on social media? ie Facebook
☐ Other: _____

10. Do you own a smartphone? ie iPhone

Please select only ONE response

☐ Yes (go to question 11)
☐ No (go to question 12)
☐ I only have a work one
☐ I have one provided and a personal one
☐ Other: _____

11. Have you ever used your smartphone to complete the following tasks?

Please select as many responses that apply to you

☐ Send a text message with multimedia? ie image/video/audio
☐ Downloaded an App? ie iTunes/GooglePlay
☐ Downloaded music? ie iTunes/GooglePlay
☐ Make or receive a video call? ie Skype/FaceTime
☐ Manage your calendar?

☐ Tethering or hotspotting?
☐ Uploaded an image to social media? ie Facebook/Twitter
☐ Tag yourself and others on social media? ie Facebook
☐ Check-in to a location on social media? ie Facebook
☐ Other: _____

12. Your organisation is rolling out iPads and providing a 3hr demonstration. How confident are you that you can learn to use the iPad in 3hrs?

Please CIRCLE one response

13. How confident are you that you can effectively judge when and how to use technology to support your students' learning?

Please CIRCLE one response

14. A vendor suggests a program that records lectures with audio. How confident are you that you can evaluate its suitability to your teaching?

Please CIRCLE one response

15. Your manager asks you to demonstrate a software program to your teaching peers. How confident are you that you can accomplish this task?

Please CIRCLE one response

16. How confident are you advising managers about purchasing educational technologies by evaluating their suitability to your teaching needs?

Please CIRCLE one response

17. Trends stress high order skills like analysis, synthesis and evaluation. How confident are you in using technology to improve these in students?

Please CIRCLE one response

18. Your students are using the internet to research a topic. How confident are you in providing them with a list of high quality websites?

Please CIRCLE one response

19. Not all students have equal access to technology. How confident are you in identifying one or more students who might have access issues?

Please CIRCLE one response

20. How confident are you that you can model and teach safe usage of technology to your students, including internet safety?

Please CIRCLE one response

21. How confident are you in using a learning management system at your organisation ie Moodle, Blackboard to deliver teaching and training?

Please CIRCLE one response

22. How confident do you feel with supplementing your teaching and training with technology ie eAssessment, wikis, videos, images, smartphones?

Please CIRCLE one response

23. How confident do you feel about creating an eBook to supplement the how you deliver teaching and training?

Please CIRCLE one response

24. Do you feel as though you have adequate professional development, training and support to integrate technology into your teaching?

Please CIRCLE one response

25. Have you ever completed the following tasks?

Please select as many responses that apply to you

☐ Installed a software program? ie Microsoft Office
☐ Updated the operating system on your computer?
☐ Played a multimedia file? (wav, mp3, avi etc)
☐ Facilitated a web conference? ie Skype
☐ Shopped online?
☐ Paid a bill online?
☐ Contributed to a website? comments, blogs, chatrooms?
☐ Created your own blog, wiki or virtual community?
☐ Developed a website?
☐ Created an eBook?

26. Are you able to complete the following tasks using a word processing program ie Word, Reader?

Please select as many responses that apply to you

☐ Edit a PDF form?
☐ Create tables, customise cells, insert and delete rows/columns?
☐ Create diagrams? ie organisational charts
☐ Include animations in PowerPoint?
☐ Enter simple formulas and functions in excel cells? ie 1A+2B = 3C

27. Do you use Facebook for personal or work reasons?

Please CIRCLE one response

☐ For personal only
☐ For work only
☐ Personal and work
☐ I don't have a Facebook account

28. Do you use Twitter for personal or work reasons?

Please CIRCLE one response

☐ For personal only
☐ For work only
☐ Personal and work
☐ I don't have a Twitter account

29. Do you have a LinkedIn account?

Please CIRCLE one response

☐ Yes
☐ No

30. What other social media services do you actively engage in?

Please select as many responses that apply to you

☐ Pin Interest
☐ Instagram
☐ YouTube
☐ MySpace
☐ Google+

☐ Other: _____

31. If you have answered '<u>YES</u>' to owning a social media account for work purposes, what do you primarily use these accounts for?

_____
_____

32. How confident would you be at facilitating a course completely online with minimal face-to-face contact with your learners?

Please CIRCLE one response

33. What types of professional development (compulsory or non-compulsory) have you attended in the past 6 months?

_____
_____

34. How would you rate the professional development (compulsory or non-compulsory) opportunities you've attended overall?

Please CIRCLE one response

35. What types of professional development opportunities would like you like to attend?

_____
_____

36. How interested are you in attending professional development designed to improve your knowledge and expertise in the use of digital pedagogies?

Please CIRCLE one response

37. How confident are you in providing support to students who ask for more flexibility in their learning? ie eAssessment, forums

Please CIRCLE one response

38. How relevant do you think digital competency is as an employability skill?

Please CIRCLE one response

39. How comfortable would you be if a student were to demonstrate more expertise in the use of technology in the classroom than yourself?

Please CIRCLE one response

Appendix C: Interview questions

Position/Title:
Size and type of organisation (small, medium, large training organisation): Years of VET experience:

Q1. How would you characterise the impact of learning technologies and its effect on the Queensland vocational education and training sector?

Q2. How has the proliferation of new and emerging technologies impacted the way you've had to manage the business/organisation?

Q3. What kinds of demand have there been for more technology enabled learning environments within your training organisation?

Q4. What types of challenges are facing current VET teachers and trainers when it comes to the use of technology to deliver learning?

Q5. How are the needs of digital literacy of your teachers and trainers being addressed?

Q6. How do you think professional development opportunities can support the digital literacy development of teachers and trainers?

Q7. If you had all the budget and resources that you required, what do you think needs to be done to improve the digital literacy skills of VET practitioners?

Appendix D: Comparison of qualifications/requirements for VET and Schools

VET (Wheelahan & Moodie, 2011)	Schools
Certificate IV in Teaching and Assessment – minimum qualification required with no minimum period of study specified or prerequisites and no existing higher education qualification for VET teaching	- Four-year undergraduate degree (including dual and combined degrees) ie Bachelor of Education - Post-graduate degree ie Graduate Diploma in Education (Department of Education, 2014)
No standard scheme or program to induct or support new teachers	The Queensland Department of Education provides a dedicated induction website which includes an online mandatory induction program. (Department of Education, 2015)
No standard national continuing professional development strategy	The Queensland College of Teachers (QCT) provides the CPD requirements for renewal of registration. (Queensland College of Teachers, 2015)
No national VET professional body	The Australian Professional Teachers' Association is the federation of state and territory joint councils of teacher professional associations representing over 160,000 teachers from government non-government schools in Australia. (Australian Professional Teachers' Association, 2015)
No explicit standards for VET teaching	The Australian Institute for Teaching and School Leadership has developed the Australian Professional Standards for Teachers. (AITSL, 2015)
No mandatory or voluntary registration of VET teachers	All teachers must register with the appropriate state or territory body. (AITSL, 2015)
VET teaching quality is not measurable as student outcomes and satisfaction data is not published	The National Assessment Program – Literacy and Numeracy (NAPLAN) is the annual assessment for students in years 3, 5, 7 and 9 for the whole of Australia. (National Assessment Program, 2015)

Appendix E: Table 4.6: Discipline areas – grouped

Faculty/Teaching area	Gender		Percent (n=202)
	Female (n=122)	Male (n=80)	
Trades			
Automotive			3.96
Building and Construction			6.93
Cookery			0.99
Electrical			1.98
Engineering			4.95
Flooring Technology			0.49
Painting and Decorating			0.99
Plumbing			0.99
Transport and Logistics			0.49
Water			0.99
Wet Trades			0.49
Total	19.57	80.43	23.29
Community, Health and Education			
Aged Care and Nursing			4.46
Beauty and Health			0.99
Children's Services			1.49
Community Services			8.41
Library			0.99
Language, Literacy and Numeracy (LLN)			2.48
Migrant Education and ESL			3.96
Horticulture and Environmental Studies			1.98
Physical Health and Wellbeing			3.96
Total	80.70	19.30	28.74
General and Administration			
General			25.25
Total	69.81	30.19	25.25
Business, IT, Science, Tourism and Creative Industries			
Business and Finance			8.43
Fashion and Retail			1.98
Graphic Design, Media and Creative			1.48
Information Technology			3.96
Science			0.99
Tourism and Hospitality			5.94
Total	65.22	34.78	22.79
Overall total	**100.00**	**100.00**	**100.00**

Appendix F: Table 4.21: From Codes to Themes

Table 4.21: From codes to themes

Codes (Step 1)	Issues discussed	Themes identified (Step 2)
- Customers/Clients - Business planning - Resources - Competitors - Decisions	- Expectations - Future planning - Budgets - Infrastructure Investments - Evidence-based - Business practices	1. Managing multiple stakeholder expectations is complex 2. Competing priorities of budgets, infrastructure 3. Making evidence-based decisions on future investments and business practices
- Digital competency - Digital impact - Reluctance - Fear - Technology - Personal/Work lives - Generational	- Varied levels of competence - Significant impact - Moderate impact - Different barriers - Accessibility - Enthusiasm - Resistance - Champions - Value - Personal lives - Respect - Needs - Generational differences	4. Teachers fall into different levels of competency 5. Technological impact on VET has been mixed 6. Teachers want to be respected, valued and supported 7. There is a home advantage/overlap in the uptake of technology use 8. Teachers experience different barriers to adopting technology
- Organisation - Compliance - Industry currency - Change	- Culture - Politics - Audit - Restructure - Respect - Legislation	9. There are ongoing cultural and political barriers to technology adoption 10. Audits and compliance can impede teacher innovation
- Professional development - PD programs - Time - Action-based	- Planning - Relevance - Frequency - Time poor - Resource poor - Applicability - Investment - Innovation - Spaces - Experimentation - Play	11. PD is well intentioned 12. Ability to attend relevant PD is challenging 13. Developing PD to suit all teaching staff is difficult 14. Investment in PD is based on the availability of resources and infrastructure 15. Innovative PD programs available 16. Teacher experimentation with ICTs
- Face-to-face - Online/e-learning	- Blended - Flexibility - Suitability	17. Students do not want to lose the human element in learning 18. Flexibility in learning is through blended approaches 19. Technology is not always appropriate

Appendix G: Table 2.22 From basic to organizing to global themes

Themes as basic themes	Organising themes	Global themes
1. Managing multiple stakeholder expectations is complex	Complex and varied expectations	RTOs need to be viable
2. Competing priorities of budgets, infrastructure 3. Making evidence-based decisions on future investments and business practices	Resources dictate decisions	
4. Teachers fall into different levels of competency	Spectrum of levels in digital competency	Teachers need to *feel* and *be* supported
5. Technological impact on VET has been mixed		
6. Teachers want to be respected, valued and supported	Lack of value and respect	
7. There is a home advantage/overlap in the uptake of technology use		
8. Teachers experience different barriers to adopting technology	Personal barriers	Barriers seem unavoidable
9. There are ongoing cultural and political barriers to technology adoption	Organisational barriers	
10. Audits and compliance can impede teacher innovation		
11. PD is well intentioned	PD tries	PD is welcome but restrained by resources
12. Ability to attend relevant PD is challenging	PD experience is not customised	Organisation tries to cater to all PD requirements
13. Developing PD to suit all teaching staff is difficult		
14. Investment in PD is based on the availability of resources and infrastructure	Resources dictate PD	
15. Innovative PD programs available 16. Teacher experimentation with ICTs		
17. Students do not want to lose the human element in learning	Face-to-face interaction is important	Blended learning is most desirable
18. Flexibility in learning is through blended approaches	Balance between delivery modes	
19. Technology is not always appropriate	Technology is not a silver bullet	

Appendix H: Figure 1.1: Timeline of major events across three years during Queensland VET TAFE reform